UNT COLLEGE OF ENGINEERING
EST. 1890

UNT College of
ENGINEERING

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Department of

BIOMEDICAL ENGINEERING

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Handheld Endoscope For Delivering Nebulized Lidocaine

Team Members:

- James Mayo
- Vincenzo Kennedy
- Namrath Dasyam
- Filiberto Aguilar

Eagle Bio Tech

External Sponsors/Mentors:

- DUALAMS Inc.
- John S Houston

Internal Sponsors/Mentors:

Abstract:

A tracheoscopy is one procedure in which the trachea is examined using an endoscope. Typically, a tracheoscopy requires the endoscope to go through the nasal cavity and then the larynx to reach the trachea, where it can be used to administer a local anesthetic. For a typical tracheoscopy, a physician will use a liquid solution of lidocaine as the anesthetic. When this liquid solution is applied to the patient's larynx, it causes gaging and discomfort resulting in a lengthy procedure time. A method has been developed to circumvent this time and discomfort by using vaporized anesthetic. The vapor lidocaine causes little to no gagging for the patient during the procedure and results in a shorter procedure time. This method of delivery currently relies on doctors to not only own an endoscope already, but to have an endoscope which includes the necessary adaptor to allow the passage of the nebulized lidocaine. Furthermore, vaporizing lidocaine and delivering it through an endoscope are both very expensive procedures that are performed separately.

By developing an internally powered, portable endoscope that can vaporize and deliver lidocaine, Eagle BioTech hopes to simplify and eliminate the discomfort for trans-nasal and/or per oral vocal anatomy examination procedures. The device will shorten time of procedures while relieving patients from gagging and discomfort. Ideally the device will be sold for under $1000, making it more affordable for local and international markets. Doctors will be able to see and control where the lidocaine is being deliver via video and endoscope controllers.

The main goal of the project is to build a working prototype of a standalone flexible endoscope with replaceable ultrasonic canister to deliver nebulized lidocaine trans-nasally, for use in oral vocal anatomy examination procedures. The images given by the endoscope will be recorded by a camera module and sent to an LCD screen to be displayed. The doctor will be able to control the flexion of the endoscope's tip and the discharge of nebulized lidocaine.

UNT COLLEGE OF ENGINEERING
EST. 1890

NGB-AL 1.0

Team Members:

- Mark Vines
- Valerie Little
- Brandon Gage
- Jose Leandro Santos

External Sponsors/Mentors:

- Assistive Technology Resources (ATR)
- Rex Moses

Internal Sponsors/Mentors:

Abstract:

The NGB-AL 1.0 is a wearable artificial larynx (AL) device designed to produce highly legible vocal output for individuals that have lost substantial speech capacity due to total laryngectomy surgery. A total laryngectomy affects an individual's capacity to speak, swallow, and breathe. In an electrolarynx, the vibration of the plastic diaphragm head against the neck creates vibrations in the throat to allow for speech. The NGB-AL 1.0 is designed as a collar to allow hands-free functionality to the user. In the current market, electrolarynxes do not offer this feature. Additionally, the NGB-AL 1.0 features the ability to control tone and volume. This device will improve the user's daily productivity and overall quality of life due to improved speech and the ability to use both hands. The amplified and filtered electrolarynx signals provide enhanced speech clarity and tone

UNT COLLEGE OF ENGINEERING
EST. 1890

Auratech Sleeve 1.0

Team Members:

- Kade Speir
- Metitiri Disi
- Peter L. Hammer

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Dr. Vijay Vaidyanathan, College of Engineering
- Dr. Logan Porter, Collge of Engineering

Abstract:

The Auratech Sleeve is a high-tech, wearable fitness tracking device that captures heart rate and electromyographic signals produced by the user. These signals are captured and transmitted via Bluetooth to the user's Smartphone using the Auratech App, available on iOS. The user's heart rate will be displayed on the Auratech App during exercise. The EMG signal, captured from extension and flexion of the user's forearm, will be used to manipulate the user's Smartphone in a customized fashion. These two signals, differentiated by a 2V difference in their peaks, will be assignable to device volume (up or down), music track skip, or phone call answer or decline. The electrodes, sensor, and electronics housing that capture EMG and heart rate will be removable from the sleeve so that It can be washed.

This technology will be contained within an attractive, moisture-wicking compression sleeve. In the fitness community, aesthetically pleasing wearable items are rising in popularity. Fitbit and Under Armour are good examples of this. The Auratech Sleeve is a thin, lightweight, compression sleeve that comes in a variety of colors. The sleek and flattering design will attract users of all ages and athletic disciplines.

UNT COLLEGE OF ENGINEERING
EST. 1890

Music Therapy Vibration Chair

Team Members:

- Madeline DeVega
- Ricardo Vela
- Ashton Baltazar
- Matthew Snoody

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Dr. Vijay Vaidyanathan, College of Engineering
- Dr Kris Chesky, College of Music

Abstract:

Physical pain is universal and can be caused by various factors that affect the body in many ways. Although there are many conventional methods to manage pain, there are still millions of Americans that suffer daily from back pain caused by injuries, illnesses, or lasting effects of medical procedures. Resonant Technologies has worked to combat symptoms of chronic and acute pain throughout the back by using physical and cognitive therapeutic techniques to create a Music Vibration Chair.

Music vibration therapy can be a reliable, viable, and scientifically significant option for pain treatment in the medical field. This device will help to stimulate the nerves through vibration, causing physical relief, while also providing the user with the cognitive benefits of music therapy. A biological feedback system will continuously monitor the user's heart rate and use the information to tailor the intensity of the vibrations supplied by motors throughout the chair to best fit the needs of each individual. The user will also be able to choose the music that aids in powering the vibration motors, which provides an enjoyable and relaxing therapeutic experience

UNT COLLEGE OF ENGINEERING
EST. 1890

Nanoparticle Distribution System

Team Members:

- Stormie Garza
- Marjaan Imam
- Christopher Steele

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Dr. Guido Verbeck, UNT Chemistry Department

Abstract:

Chemotherapy results in the large-scale death of healthy tissue and radiation poisoning in the patient, and removal of tumors in surgery cannot ensure the complete removal of cancerous tissue. Currently scientists are researching the effectiveness of nanoparticles in cancer treatment. Due to their reactive nature, nanoparticles can be used in various applications, more importantly medical applications. SANE Tech aims to reinvent the approach to cancer treatment with the Nanoparticle Distribution System.

The Nanoparticle Distribution System device will create and deliver nanoparticles to a localized cancerous area on the human body. This distribution system will be comprised of a vacuum chamber, a mobility cell, a laser system, and a user interface. The nanoparticles will be created in a vacuum chamber using laser ablation on metal sheets. During laser ablation, the laser will focus onto the metal sheet, and the pulsing of the laser will irradiate layers from the material. The vaporized material will react with surrounding material and condensate into nanoparticles. These condensed nanoparticles will be collected and deposited. The nanoparticles will travel through a stainless-steel mobility cell to ensure that the all of particles can be transferred without interference. The device will also feature customizable delivery of the nanoparticles to the designated area using a diode targeting system. An interface will allow for the user of this device to accurately target and distribute nanoparticles.

SANE Tech strives to create and distribute nanoparticles (using metals effective in cancer treatment) to patients with cancerous tissue. By rethinking the current approach to cancer treatment, it is possible to prevent negative results in patients. A device that administers nanoparticles is essential to improving cancer removal techniques because it provides a basis for many future treatment applications. Creating and distributing nanoparticles is essential in improving cancer treatment since the ultimate purpose is to limit the damaged cells and prevent cancer from spreading.

UNT COLLEGE OF ENGINEERING
EST. 1890

Vigilant Monitor

Team Members:

- James Martinez
- Ian Zurutuza

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Dr. Vijay Vaidyanathan, College of Engineering

Abstract:

Sudden Infant Death Syndrome is an unpredictable tragedy where a seemingly healthy infant under a year old perishes, usually while sleeping. To increase an infant's probability of surviving the onset of SIDS and give parents peace of mind Mazu Medical developed a smart baby monitor. This monitor, a crib mounted video camera connected wirelessly to a bedside display unit, uses real-time Eulerian Video Magnification to detect heart rate. If the infants heart rate becomes critically low, the monitor activates a 3 stimulus response consisting of an alarm, bright flashing lights, and vibration attempting to induce crying, arousing the infant and alerts parents via their bedside unit.

UNT COLLEGE OF ENGINEERING
EST. 1890

One BioMedical

Team Members:

- Abisay Olivares
- Bryan Guerrero
- Gustavo Henriquez
- Cedale Kim

External Sponsors/Mentors:

- Smith & Nephew

Internal Sponsors/Mentors:

Abstract:

Currently, Smith & Nephew, a bio therapeutics company processes Bovine Collagen by taking small, 2-3 cm cubes and blending them with a kitchen blender. Furthermore, after the collagen has been properly blended, it is then taken to an individual worker to manually separate with tweezers into thin fiber strands; moreover, the appearance of the fiber depends on the judgment of each worker. This current process is labor heavy, costly, and time consuming. Therefore, the project goal that one biomedical has been tasked with, is to develop a semi-automatic processing device that will obtain the desired collagen fibers, decrease labor, time, cost, and ultimately replace the current methodall together.

UNT COLLEGE OF ENGINEERING
EST. 1890

Department of

COMPUTER SCIENCE AND ENGINEERING

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

PRiSM

Team Members:

- Prajwal Waiva
- Roshan Karki
- Samantha Akos
- Matthew Maddox

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Dr. Robin Pottathuparambil
- Clement Cole

Abstract:

Stock plays a vital role in any company/country's economy. It provides capital for companies and reflects financial health of any country. To be able to predict highs and lows of any company's stock would help in profitable investment. Use of neural network as part of algorithm for prediction comes from two different source i.e. software and hardware for comparing the most precise values. This is hoped to create opportunities for economic growth.

UNT COLLEGE OF ENGINEERING
EST. 1890

Spacecraft Lighting Network System: 2b | !2b

Team Members:

- Taylor Shinn
- Gladys Hernandez-Amaya
- John A. Todd
- Jorge Cardona

External Sponsors/Mentors:

- George Salazar - NASA

Internal Sponsors/Mentors:

- Dr. Robin Pottathuparambil – UNT
- Adam Chamberlin - UNT

Abstract:

Our project goal is to use off-the-shelf commercial devices to implement the DMX-512 lighting protocol for managing a network of LEDs. We demonstrate the utilization of this network by simulating the circadian lighting patterns as a proof of concept for future deep space missions. At this time commercial lighting bus standard chip sets are not suitable for intense cosmic radiation environments. Our solution in the Space Lighting Network System is for all clients to implement the Open Lighting Architecture(OLA) framework for DMX-512, and the server to relay all commands from a central graphical user interface using Raspberry Pis. The reason for doing so with programmable devices, is so that hardened or radiation tolerant devices can then be implemented. A few limitations that led to our design plan is the weight of hardware currently used in stage lighting. The SLNS will be a robust, fault tolerant, dynamicly scalable network of cost effective microcontrollers.

George A. Salazar P.E of NASA

Dr. Tim Urban and Talia Jurgens of TSGC

Dr. Barrett Bryant of the UNT CSE Dept.

Dr. Robin Pottathuparambil of the UNT CSE Dept

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Emergency Life Detection System

Team Members:

- Shobin David
- Justin Jacob
- Abdullah Almofeez
- Huy Ly

External Sponsors/Mentors:

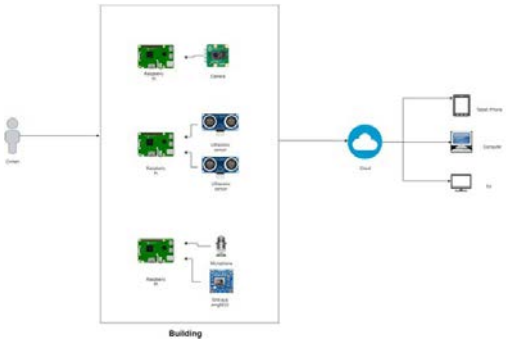
N/A

Internal Sponsors/Mentors:

Dr. Robin Pottathuparambil
Thomas Kanabay

Abstract:

The Emergency Life Detection (ELD) system will aid first responders in detecting individuals inside a building. The ELD system will be a building installed service and composed of three main components: Building Entrance, Building Rooms, and Cloud data.



The entrance system will use facial recognition technology to track and recognize people entering and exiting a building.

The building room component of the system is able to monitor room activity and determine the location of people in the event of an emergency using a sensors system composed of thermal, ultrasonic, and microphone sensors.

The final component of the system will involve the cloud to backup and process the data at all times. The sensor data will be analyzed and used to provide information on the location of individuals inside the building. The data can only be viewed by authorized personnel to ensure building safety .

UNT COLLEGE OF ENGINEERING
EST. 1890

Apollo's Legacy – Intelligent Lighting Control System

Team Members:

- Jesse Boswell
- Cory Fairweather
- Charles Goff
- Scarlett Jones

External Sponsors/Mentors:

- George Salazar, NASA

Internal Sponsors/Mentors:

- Dr. Robin Pottathuparambil

Abstract:

As mankind attempts to travel deeper into space, the need to have spacecraft with intelligent lighting systems is on the forefront. Lighting systems need to be reliable, use less power, compensate for outages or degradation of lights, and help astronauts be more productive by helping maintain their circadian rhythms. Longer missions will require sources of food for the crew members. We propose that we add the ability to grow vegetation, control system settings using voice control, and increase the networking abilities for the current lighting system.

George A. Salazar, Dr. Tim Urban, Talia Jurgens, Dr. Robin Pottathuparambil, Team Spatium Lucis, Thomas Kanabay, Zachary Simpson, Office of the Dean for the College of Engineering at UNT

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Detecting Disease Contacts/The Cavalry

Team Members:

- Travis Shatto
- Deepkumar Mistry
- Julian Bugarin
- Pal Bajwa

External Sponsors/Mentors:

- Not Applicable

Internal Sponsors/Mentors:

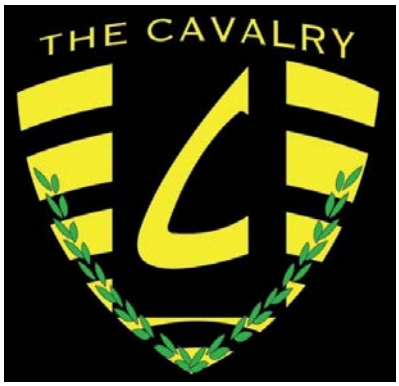
- Dr. Armin Mikler (Sponsor)
- Dr. Robin Pottathuparambil (Project Manager)

Abstract:

The Disease Contact Detectives (DCD) team (UNT, 2016-2017) accepted a proposal to create a research tool to assist in research directed by Dr. Armin Mikler from the University of North Texas. This research tool, known as the Detect Disease Contacts Initiative (DDCI) tool, is capable of measuring the number of contacts a person encounters in an average day. This is achieved by detecting the presence of an individual (or multiple people) within a 6 feet, 360-degree field of view by using a variety of commercial components.

A volunteer will wear the DDCI tool for a period up to 12 hours. During this period the tool collects data on the contacts the volunteer encounters. Once the volunteer is finished with the tool the research data is collected by the use of two mobile Android applications; one mobile application is designed to transfer the research data to an AWS storage service while the other application is used to display the final results of the processed data. Ultimately this data can be analyzed by Dr. Mikler and his research team. To facilitate this functionality the tool sustains the power and data requirements for the 12-hour period. This research data has many applications but it is primarily focused on the potential to identify where airborne illnesses are commonly spread.

Our team has improved the functionality of the DDCI tool by moving the post-processing procedure to an online system using several Amazon Web Services (AWS), upgrading the infrared thermal sensor for greater accuracy, creating a more discreet and compact platform for the system to be placed, and developing two mobile applications capable of transferring raw data and viewing processed data.



Thomas Kanabay – Lab Manager

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Computer Security Investigators: Hardware Based Trustworthiness System

Team Members:

- Jeremy York
- Spencer Igwe
- Eric Salas
- Charles Rasmussen

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Dr. Robin Pottathuparambil
- Dr. Krishna Kavi

Abstract:

The intent of this project is to create a hardware-based computer security system. We are attempting this because we want to find a faster and more stable way to protect a computer. We believe that the current solutions are too slow and require too much power from the computer that it's protecting. We also believe that our way is much more difficult to trick because no new algorithms are required to check for any new viruses.

The project is designed around an external device (an FPGA in this case) that communicates with the computer using a USB connection. We created an application to push all relevant files on a computer to the external device to check whether any file has been modified. Each file will be passed through an algorithm in order to create a base "integrity measurement" that will be checked against in future scans. Our intent is to use the parallelism of the FPGA to create a much faster algorithm than a regular PC would allow.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Intelativ

Smart Home and Security System

Team Eclipse

Team Members:

- Alejandro Olvera
- Gibran Castaneda
- Isa Adeyemi
- Miguel Hernandez

External Sponsors/Mentors:

- Intelativ

Internal Sponsors/Mentors:

- Dr. Robin Pottathuparambil
- Dr. Mark Thompson
- Dr. Pradhumna Shrestha

Abstract:

Currently, Smart Home and Security systems rely on third- party software and hardware to function. An internet connection might also be required in order to process voice commands and other vital system information. This presents a risk since it exposes the system to outside attackers, and also compromises home security when internet or other services are unavailable.

Our system aims to solve this problem by using a private secure network that processes voice commands locally. We have prototyped several types of sensors and controllers to demonstrate basic smart home functionality. Our system also includes the use of a console and an Android application to control the system. This project required working as a team of four, and we all used our skills in programming, networking, hardware, application and GUI design to complete it.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Medicine Minder – Team FroZone

Team Members:

- Aaron Mayville
- Andrew McAllister
- Brian Pullen
- Zack Watkins

External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- Dr. Robin Pottathuparambil
- Dr. Thomas Derryberry
- Thomas Kanabay

Abstract:

The problem we are trying to solve is being able to cool medicines portably in a timely fashion. Once the medicine is cool, our device will then keep the medicine at its desired temperature range.

The Medicine Minder will help preserve prescription drugs and ensure that medicines are secure and consumable.

Our project is unique because of its portability, and its ease of use. Once the user selects a medicine, the Medicine Minder does the remainder of the work. This makes our device user friendly and easy to learn how to operate.

UNT COLLEGE OF ENGINEERING
EST. 1890

Enhanced Bike Safety System (E.B.S.S)/ Insomnia

Team Members:

- Aaron, Arthur
- Brady, Almond
- Edward, Reyna
- Rickey Proby

External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- Robin Pottathuparambil
- Thomas Kanabay

Abstract:

There are many bicycle accident cases that happen every day, because either the rider loses balance or they are not focused on the road. Our goal for this project is to reduce the chance of an accident, and it improve the time for help to arrive when they do happen. We will accomplish this by having a built-in turn signal, and a crash detection system on the helmet. The turn signals will allow the user to signal without removing their hands from the handlebar, therefore allowing them to keep their balance better. The crash detection system will inform the user's emergency contacts that they were in an accident, which allows the emergency contacts to call help for them. The E.B.S.S also has a set of cameras to allow the user to always see what's going on behind them, and to record video so the user can use it if they get into an accident that was caused by someone. The bike will be self-powered to allow the user to ride without any worry of battery life. The user can also view his/her speed and heart rate will biking.

Google.com, StackOverflow.com, Robin Pottathuparambil, Thomas Kanabay

UNT COLLEGE OF ENGINEERING
EST. 1890

Triumph Group, Inc.

Rhyno

Team Members:

- Rickey Dixon
- Yessenia Ramos
- Ryan Kaakaty
- Hamdi Hmimy

External Sponsors/Mentors:

- Don, Triumph Group, Inc.

Internal Sponsors/Mentors:

- Robin Pottathuparambil

Abstract:

Large structures of aircraft like fuselage, wings, and other parts are built by riveting aluminum, steel, or titanium sheets together. These are very large structures and require 100s of rivets to combine and construct various structures needed for the aircraft. These rivet locations are marked by technicians using stencils and then verified and drilled to place the rivets. The markings needs to be very accurate, within .003 inches and a small error could make these large sheets unusable. The goal of the project is to automate the entire rivet process by using a robotic arm and a mechanical slide (designed and fabricated by the mechanical engineers) to precisely mark the rivet locations.

UNT COLLEGE OF ENGINEERING
EST. 1890

Sleep Apnea Monitoring & Diagnostic System

Team Snooze

Team Members:

- Yale Empie (Team Lead & Reporter)
- Tyler Anderson
- Andrew Asdel
- Jason Van

External Sponsors/Mentors:

- Edwin Simon, MD

Internal Sponsors/Mentors:

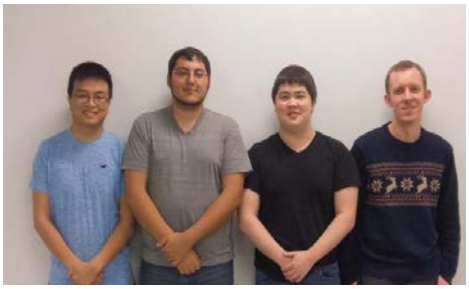
- Dr. Robin Pottathuparambil

Abstract:

Approximately 25 million adults in the U.S.A suffer from Obstructive Sleep Apnea. This is an ailment that causes a person to cease breathing for small periods of time throughout their sleep. It is a large risk factor that can lead to development of other, worse conditions such as hypertension, coronary artery disease, stroke, depression, and even dementia.

Current sleep studies are done in-lab in an unfamiliar environment, with diagnostic tools that cost upwards of several millions of dollars. It is also incredibly labor intensive and difficult for a patient to get into a sleep study for diagnosis due to the number of available sleep study locations in a region.

Our project set out to create a solution that would allow for a patient to do an effective sleep study within the confines of a familiar environment, such as their home, so that the patient can be properly diagnosed with Obstructive Sleep Apnea.



From Left to Right: Jason Van, Tyler Anderson, Yale Empie (Team Lead & Reporter), Andrew Asdel

We would like to acknowledge the immense help that Thomas Kanabay has lent our team in making this project to completion.

VIEC Network System

Team Members:

- Marco Duarte
- Richard Ervin Jr.
- Kaothar Sowemimo
- Alberto Olvera

External Sponsors/Mentors:

- George A. Salazar, P.E. ,ESEP

Internal Sponsors/Mentors:

- Robin Pottathuparambil, PhD

Abstract:

Whenever a space shuttle goes into space, a number of controllers are needed to control the various systems in the craft. If a controller breaks, it will need to be replaced. One option is to send replacements, but for a shuttle far way from earth, this would be too time consuming. Taking extras of each type of controller is also an impractical option because they add to the weight of the cargo, which translates into a greater cost to get enough fuel to send it all into space. The Vehicle Interchangeable Electronic Controller(VIEC) Network System aims to alleviate some of this burden by creating a system of interchangeable controllers (IC) that can be interchanged into the network at any time. The server that manages this system loads the appropriate application IC whenever a new one has been plugged in. A universal connector will be used to interface the ICs with the corresponding input devices. The simulated systems will be a Habitat Lighting System, Environment Monitoring System, and a Reaction Control System.

.

UNT COLLEGE OF ENGINEERING
EST. 1890

DROP TABLE Teams

Team Members:

- Kamyak Addagatla
- Jay Bishop
- Tara Boyle
- Hansaj Patel

External Sponsors/Mentors:

- Team members' mothers
- Tara's friend who is a mother

Internal Sponsors/Mentors:

- Stephanie Ludi

Abstract:

Track My Baby is intended to be a mobile application to allow new parents/caregivers to track milestones and everyday life occurrences involved in caring for babies. Life occurrences include events such as feedings, diaper changes, and sleeping. With this application, our goal in its implementation is to allow for potential users to be able to sync the milestones and data collected across multiple devices as well as be able to share needed data with a pediatrician (or the parents if being used by a caregiver). Track My Baby will be an essential tool that will aid parents in raising and caring for their babies.

This will help parents keep up with their babies needs. Help everyone using the app and the baby to remember there medication and allergies. The tracking done will help doctors diagnose illness with their baby easier and more accurate.

Our app stands out due to sharing baby track data with doctors and caregivers. Also stands out with illness tracking and friendly user access.

We'd like to acknowledge Android studio forms and Google firebase.

UNT COLLEGE OF ENGINEERING
EST. 1890

Team Hydra

Team Members:

- Nohemi Gonzalez
- Aaron Bucklin
- Jose Salazar
- Robert Torres
- Russel Price

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Stephanie Ludi

Abstract:

With the integration of technology into every aspect of our society and with there being no industry in which computers have not take a central role, there is a push in education to teach younger generations about the fundamental concepts of programming and computer science. While there have been some curriculum shifts to include the subject in various schools and grades, the trend has been slow to spread. Outside of the classroom, searches for games and apps both online and in the phone market have shown that there is no medium that is targeting this age group in a relatable and engaging way.

The aim of this project is introduce to children between the ages of seven and eleven the basics of Boolean Algebra as well as fundamental coding concepts such as if-else statements, while loops, and for loops. Through an interactive and progressive learning style, it is our hope to ingrain these core concepts in an immersive and fun environment that will spark a lifelong interest in a diverse and rewarding field.

UNT COLLEGE OF ENGINEERING
EST. 1890

Inventory Management System (IMS): EP.CF()

Team Members:

- Ethan Pomish
- Cameron Fullerton

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Stephanie Ludi

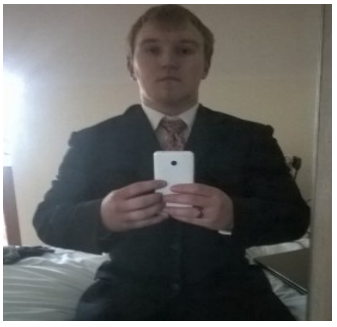
Abstract:

Mom and Pop shops are the backbone of America, though they frequently lack the resources to pay for complicated and expensive inventory management systems. Most of these systems are tailored to suit larger store fronts and are feature rich at the expense of simplicity and usability.

Inventory Management System (IMS) by EP.CF hopes to provide an easy to use and EXTREMELY inexpensive method of managing inventory for small businesses. Simple inventory management procedures with minimal keystrokes and click- counts allow these businesses to reduce training cost and manage their inventory on older machines with less available resources.

IMS allows mulJple levels of users to access different levels of funcJonality depending on their role in the business. A standard user will only have the ability to check-in the weekly truck shipment, modify item descripJons, and ensure the accuracy of inventory during cycle counts. An elevated user will have the ability to add and remove user access, shrink inventory, and even delete an enJre store's inventory.

Ethan Pomish



Cameron Fullerton

UNT COLLEGE OF ENGINEERING
EST. 1890

3 Factor-Authentication Project name: Halfway

Team Members:

- Daniel Jimenez
- Gabrielle Cordray
- Brandi Werner

External Sponsors/Mentors:

- Vicki White-Community and Family Relations Coordinator of Cottrell Halfway House Texas Juvenile Justice Department

Internal Sponsors/Mentors:

Abstract:

The Cottrell house is part of the State Juvenile Justice Department. Once county resources cannot support the youth with felonies in their system, the youth are transferred into the state system where they will be enrolled into a state school. Typically, the youth are transferred into a halfway house before they are released on parole. Halfway houses bring the youth from a closed facility to an open facility with integration programs. These homes serve the residents by aiding them to adjust to normal life. The hope is that the halfway home experience rehabilitates the youth and gives them foundations to become productive members of society. Unfortunately, once they leave the halfway home they may not stay on the right track.

We have proposed an idea to supplement the support given to the youth. We will be creating a web friendly and mobile friendly website to serve as a support system for the juvenile offenders to use during their time in the halfway home and after they leave the Cottrell house. The website will connect the youth to a mentor to ask questions, as well as peers to have discussions and seek support. The aim of our project is to have a positive social impact on juvenile offenders who are in, or have left halfway homes, to ensure they stay on a positive track, and are aware of resources they have for help.

UNT COLLEGE OF ENGINEERING
EST. 1890

Baby Aid

Team Members:

- Jaylan McLendon
- Nathan Cramer
- Naumaan Hassan
- Aaron Batch

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Dr. Stephanie Ludi

Abstract:

Taking care of children is known to be a very tough job. In this task, a parent/caregiver must be able to take care of multiple things such as feeding sessions, napping sessions, medicine-giving sessions, and many other things for the child/children that they are taking care of. Many people do these activities without recording the important information that can be acquired from them, and when they do, they must use potentially annoying methods like pen and paper.

The purpose behind this application is to keep track of the many caretaking activities and the important information in those activities a child's caretaker finds themselves engaging in (feeding sessions, napping sessions, etc.). This app endeavors to ease that burden upon the caretaker by providing a means where they can log, view, and share important data regarding the child they are taking care of.

With this tool, a parent/caregiver can potentially bring some more organization into their parenting/caregiving lives while also allowing them to improve some of their many parenting/caregiving skills.

UNT COLLEGE OF ENGINEERING
EST. 1890

CodeQuest: megabite

Team Members:

- Hailey Burleson
- Kevin Hinson
- Malesa Williams
- Mohammed Abdali

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Stephanie Ludi

Abstract:

We are making megabite in order to show preferred food restaurants along a route. You simply put in where your destination is and the type of food you're interested in, as well as restrictions like vegetarianism or Kosher friendly locations, and our app will query Google Maps (for routing), and Foursquare (for more information on found locations) in order to find locations that are along the route. In addition, menu and venue information will be shown for places selected.

UNT COLLEGE OF ENGINEERING
EST. 1890

UNT Onboarding by Team Lenny

Team Members:

- Edgar Sanchez
- Justin Penny
- Steven Wyman
- Tsung-Han Hsieh

External Sponsors/Mentors:

- UNT Grad Students

Internal Sponsors/Mentors:

- Stephanie Ludi

Abstract:

Most UNT CSE grad students come from outside of the DFW area (or even the US). It would be great to have a web app that they could use as they plan to relocate here and once they arrive to help them settle into the area, UNT, and the department.

UNT Onboarding will provide a way for CSE grad students to have a central location to find invaluable information related to their new University and surroundings such as information regarding UNT, CSE grad student programs, Denton transportation, and city life.

UNT Onboarding

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Bloom: Healthcare Made Easy

Team Members:

- Michael Bido-Chavez
- Miguel Melendez
- Thomas Miller
- Victor Musasia
- Steven Harris

External Sponsors/Mentors:

- Sylvia Musasia, RN

Internal Sponsors/Mentors:

- Dr. Stephanie Ludi

Abstract:

There are several problems with existing electronic medical record systems (EMRS). These problems include the dependence on legacy software, poor user interfaces, and the lack of information access and control for patients. Bloom solves this by providing a new environment for instant access to patient records for both medical staff and patients. Patients are able to share record access by adding practices, schedule appointments to meet with their doctors, and minimize the amount of paperwork involved with their healthcare.

As a web application built on ReactJS, Bloom provides users access from anywhere with an internet connection and a javascript enabled web browser. As users work with this system, their work is backed up by Google's Firebase, to ensure secure remote storage. Additionally, Bloom provides a modern platform that is independent of legacy systems unlike other EMRS.

BLOOM

TESLA BOYZ

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

DigitalAdvisor

Team Members:

- Benjamin Meaders
- Jacob Hanson
- Andrew Harres
- Anthony Hicks
- Brennan Schamberger

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Stephanie Ludi
- David Lowell

Abstract:

Currently, the busiest students in our community are held at a great disadvantage as they often don't have the time to attend an advising appointment. They are left on their own to attempt to decipher their degree audit and course catalog, and could possibly run into the problem of taking courses that they don't have to, wasting time and money in the process. DigitalAdvisor solves this problem by recommending courses to students based on their current progress through their degree and lines up all of their semesters until they graduate.

UNT COLLEGE OF ENGINEERING
EST. 1890

BabyLog

Team Members:

- Pedro Miranda
- Erick Ortiz Barrera
- Arturo Rodriguez
- Danny Salas
- Aisha Shrestha

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Dr. Stephanie Ludi

Abstract:

Our app helps the busy parent track their baby's activities. The first month of the baby development is an exhausting period for those parents that are adjusting keeping track of their newborn daily schedule. The BabyLog app will help parents reminding/tracking about feeding, sleeping time, vitamin supplement and diaper change time while visualizing the data via graphs.

Our goal is to provide an easy to understand user interface. Where the user is able to learn how to navigate the menus and screens fluidly. As a busy parent, we want the user to quickly record their baby's information. Then at the end of the day be able to see all the important details in the summary page and also view this information in graphs to better understand their baby's development.

We created a unique design using big fonts and buttons to help the busy parent navigate the system as easy as possible. One of our goals is to help the user be able to use our app in a one-handed motion and use shortcuts to quickly access the important features of the app. Keeping everything concise and easy to understand is what makes our app different from other apps in the market.

BabyLog

Team Savage

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Home Chores

Team Members:

- Tai Nguyen
- Esteban Delasancha
- Cameron Cook
- Luis Chaparro
- Alish Shrestha

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Dr. Stephanie Ludi

Abstract:

Social Function theory suggests that we all serve a purpose in society in order to keep harmony within the society, and this harmony is what our team intends on facilitating in the home setting. The Home Chores application serves to allow a household leader to organize and maintain order throughout the home through the scheduling of chores and utilization of reminders. With the home database at the push of a button, users can better organize their family's tasks, manage household upkeep, and increase overall productivity within the home.

TESLA

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Fi Message

Team Members:

- Aaron Hamilton
- Chase Parker
- David Walker
- Keith Santamaria
- Kristopher Duran

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Dr. Stephanie Ludi

Abstract:

Looking at encrypted messaging applications we noticed a few things. Either you can only message users with the app, the messages get stored on a database, data is being sold to companies for advertisements, or the app is owned by Facebook. Our goal is to create the best and most secure messaging application on the market. Our team of developers is doing this by solving problems other messaging apps have by creating an all in one application that allows users to communicate with friends and family without the app, sending encrypted messages directly to other users, and not collecting users' meta data. Having one application is user oriented because it helps keep all their messages in one place. Having the messages being sent directly from peer to peer instead of being sent through a server and stored gives the users piece of mind that unauthorized parties will not be able to read their private conversations. Our app does not have data to sell to uses' because we cannot read their messages, so they do not have to worry about data mining.

UNT COLLEGE OF ENGINEERING
EST. 1890

Infinity

Team Members:

- Andrej Rosolak
- Ben Jimenez
- Saina Baidar
- Spencer Ronshagen

External Sponsors/Mentors:

- Antonio Chamorro

Internal Sponsors/Mentors:

- Dr. Stephanie Ludi

Abstract:

Life can be busy and full of responsibilities. Whether being a parent, college student, having a full-time job or any combination of these, it can be overwhelming. Owning a pet will only add to those responsibilities. Sometimes, owners forget to walk their pet or get food for their pet. Also, pet information such as medical records can be hard to keep track of. Creating an app to help keep up with pet duties will lighten the load of work needed to take care of pets. Pets will be in a happy state due to their needs being fulfilled. The app will be an innovative way to take care of your pet. Pet owners will be able to set reminders when to perform certain task. When taking them to the veterinarian, important information will be accessible quickly through the app. When having a friend pet sit, allergy information can be easily shared. Overall, the app will make it easier for pet owners since it reduces the stress of having to remember and keeps information organized.

Pet Friend

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

SINCE 2018
NEPMART

Ecommerce Solution For Nepal – TEAM VIPER

Team Members:

- Anjan Shrestha
- Sandip Gurung
- Upawan Khadka
- Roshan Pandey

External Sponsors/Mentors:

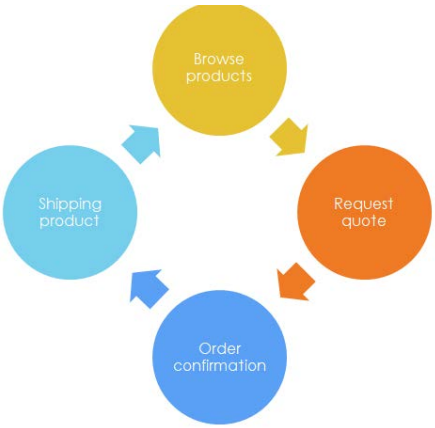
- Yuvraj Budhathoki (IAM Access Adminsitrator Process Engineer, AIG – Houston, TX)

Internal Sponsors/Mentors:

- Dr. Stephanie Ludi
- Amar Maharjhan

Abstract:

Online shopping in Nepal is currently is still a new concept and limited to country's borders. People have no easy medium to shop online, and make purchase through websites, such as Amazon, E-Bay or any other online retail store. There are several obstacles which contribute to this factor. Firstly, debit cards and e-checks are not allowed for online shopping or any foreign transaction. Credit cards are the only way to purchase merchandise online, but credit cards are only issued to people with substantial wealth. Furthermore, big monetary transactions done online (usually more than $1000) are blocked by the banks or credit unions that issue the credit cards under various government regulations. The goal of this project is to create an online shopping platform that will enable and make it easier for people in Nepal to make buy merchandise online. This website will attempt to provide a fast and restriction proof way for the people in Nepal to order item globally through websites, such as Amazon, E-bay or any other retail websites.



UNT COLLEGE OF ENGINEERING
EST. 1890

Supplies for Teachers/ Green Team

Team Members:

- Rawdhah, Al Shaqaq
- Sundos, Al Subhi
- Syed, Asad
- Tevin, Mosley

External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- Dr. Stephanie Ludi

Abstract:

Free supplies for teachers is a website which allows donor to post supplies of different sorts that can be useful for school/teacher. K12 teachers will conveniently look for stuff that they want to use in the class from the website.

The goal is helping teachers by donating the supplies through the website.

The unique thing about our project is that we are trying to help schools and teachers to obtain what they need for classes, we are also helping parents to spend less money for their children while giving students the opportunity to have all the supplies they need and lastly giving people the opportunity to donate stuff.

GREEN TEAM

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

UNT Events Package

Team Members:

- Charles Bido
- Zachary Eisenhauer
- Zachary Langley
- Axel Yates

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Classroom Support Services

Abstract:

We are trying to solve the segregation of events on campus. We believe it is hard to advertise and find events at UNT due to the amount of sources and lack of unification.

Our solution is to build a REST API for events that can take in from multiple sources and send all the information needed to any application that wants to display the events. This is innovative because there isn't officially supported adapters for tools like Ad Astra, EMS, and University Tickets. In order to unify events at universities, the school would just have to try to pick a catch all system instead of being able to utilize different systems for different catches. Also, REST APIs are a newer concept, but easy to work with as a developer so events can be viewed in unique ways. For example, students can look at a map to see events around them and their schedule rather than a calendar. Students can also explore events by groups rather than time. We believe consolidating and giving access to information this way opens a lot of opportunity for UNT and other universities in the future.

UNT COLLEGE OF ENGINEERING
EST. 1890

The Usual:
Food Recommendation Platform

Team Members:

- Roger Gray
- Rey Castro
- Tyler Duff

External Sponsors/Mentors:

Ricky Yamashita

Internal Sponsors/Mentors:

David Keathly

Abstract:

The Usual is a website that allows users to browse restaurants as well as track, save and share their favorite selections. It also features a recommendation feature to help the food selection process, which can oftentimes be harrowing. There are three main features:

- **Profile:** A user may set a profile picture, display personal information, and save favorite food items to their profile. From here they have the option to share their selections on several social media sites.
- **Browser:** The browser features a map of restaurants in the area along with a menu of food items that they serve. In the browser, the user may select any food item as a favorite and save it to their profile.
- **Prim Recommends:** Our website also features a recommendation page. In it, we implement a swipe-left/swipe-right stack to have our mascot, Prim the Cat, choose a food item for a user based on past choices and favorites saved.

UNT COLLEGE OF ENGINEERING
EST. 1890

MERIDIAN BUSINESS CENTERS

Giganto Inventory / Team Dynamo

Team Members:

- Reginald Barnes
- Brandon Hastings
- Juhn Baek
- Tavon Hayes

External Sponsors/Mentors:

- Josh Bell – Meridian Business Solutions

Internal Sponsors/Mentors:

- David Keathly – Capstone Professor

Abstract:

We were given the opportunity to work with Meridian Business Solutions to create an inventory system to keep track of important assets. This product is unique in that it can keep track of assets in multiple locations but also provide reports to help determine what assets are needed to be replenished as well as which individuals have made changes to the system.

Senior Design Day 2018

UNT Factory by Stragetic Gravity

Team Members:

- Cody Johns
- Cherise Doublin
- John Knowles
- Matt Partida

External Sponsors/Mentors:

The Factory at UNT - Judy Hunter

Internal Sponsors/Mentors:

David Keathly

Abstract:

Our group worked towards creating a new website for the UNT Factory to use. The Factory is a 3D printing lab that allows students to submit files that are then 3D printed for the students.

We worked on creating an entirely new website both the front end and the back end. In the process we created a login portal for the site admin and users. We also created forms that allow a student to submit a file and have it approved by the staff at the factory.

One of the biggest obstacles we had involved connecting to the payment portal. We had to interface with an existing payment system so that the students can pay for their 3D prints.

We would like to thank the Factory for sponsoring us in this year long capstone project.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

ITSS Status Board Refresh - Rook IT

Team Members:

- Cyrus Bahrami
- Nick Partridge
- Rayneil Williams
- Tyler Cook
- Jacob Shafer

External Sponsors/Mentors:

- None

Internal Sponsors/Mentors:

- Andy Mears
- Michael O'Rourke
- Gordon Albury
- Christopher Hutson

Abstract:

We are trying to demonstrate the first integration of an enterprise service bus with the UNT ITSS department.

The ITSS department has dozens of services that are actively being monitored and tested at any one time. The problem with this, is that with every new service that is added: there must be a new set of customized options and protocols for it to be integrated correctly into the UNT network.

Having a service bus with a set of defined protocols that enables any new service to only be customized to the service bus, as opposed to every interlocking application of the network would be a great step forward for the department.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

ResqueMe

Team Members:

- Joseph Tye
- Zach Newman

External Sponsors/Mentors:

- None

Internal Sponsors/Mentors:

- Dr. Kamesh Namuduri

Abstract:

ResqueMe is a web-based platform that allows first responders and volunteers the ability to work together during natural disasters and major emergencies providing a framework for collaboration, communication, and information dissemination between personnel.

ResqueMe uses lessons learned during recent disasters and utilizes technology to mitigate the problems often seen in large-scale disaster response.

UNT COLLEGE OF ENGINEERING
EST. 1890

CSE Scheduling Assistant

Team Members:

- Andrew Manley
- Alexandra Martinez
- Jesse Culver
- Alexander McCulloch
- Donald Jones

External Sponsors/Mentors:

- Dr. Armin R. Mikler – CSE Professor UNT

Internal Sponsors/Mentors:

- David M. Keathly - CSE Professor UNT

Abstract:

Problem:

The process is done manually without computer assistance Forming several problems.

Conflicts:

- Enrollment vs Room Capacity
- Instructor Assignment
- TA and Grader Assignment
- Dynamic Data: Waitlists
- Room Assignment/Reassignment

Solution:

A web based user interface that will allow a conditional search that returns filtered data in an organized fashion easing the process significantly.

UNT COLLEGE OF ENGINEERING
EST. 1890

Makes Sense – Foot Traffic Analysis

Team Members:

- George Tipton
- Andrew Johnston
- Grant Jackson
- Travis Johnson

External Sponsors/Mentors:

- Signal Aware:
- Adam Perschke
- Adam Kila
- Brooks McMilin

Internal Sponsors/Mentors:

- David M. Keathly (University of North Texas)

Abstract:

The University of North Texas is an ever expanding grounds for both students and staff to grow, learn, and work. With the addition of new facilities, expanding and changing infrastructure, and implementation of better accommodations to University staff and students.

In order to ensure efficiency in commuting and that community members are taking full advantage of University resources and offerings, it's important to analyze traffic patterns on our University walk-ways and recreational/break areas.

We, paired with a sensor-based research company Signal Aware, gathered significant traffic-related data on campus in order to generate ideas for how to make our walk-ways more efficient, make staff and student accommodations more effectively located, and identify prime areas for placing advertisement and marketing material on both UNT's main campus, as well as at UNT's Discovery Park campus.

Special thanks to: Rory Rivoire (UNT Datacomm), Sean Martin (UNT Datacomm), Rich Anderson (UNT IT Security), Charlotte Russell (UNT IT Security), UNT Institutional Research Board

UNT COLLEGE OF ENGINEERING
EST. 1890

GM Tile&Coping
Building Solutions

GM Tile&Coping / GADG(IT)

Team Members:

- Gezim Kashtanjeva
- Alejo Ponce
- Daniel Martinez
- Gustavo Martin Jr.

External Sponsors/Mentors:

- Gustavo Martin Sr.
- GM Tile & Coping

Internal Sponsors/Mentors:

- Mentor: Professor David Keathly

Abstract:

Mr. Martin was in need of an online portal/e-commerce store, for his clients as well as future clients, where his company could advertise, estimate, showcase and be reached via email at anytime.

Through modern designs, as well as ease of internet tools, my team and I have designed, per spec, what was needed by Mr. Martin. Being exposed to online environments allows for optimum use of resources available. The addition of a web based platform for the company allows for global reach if ever decided by Mr. Martin.

UNT COLLEGE OF ENGINEERING
EST. 1890

Beyond Denton

Beyond Denton

Team Members:

- Sean Van Zanden
- Brandon Reid
- Tyler Thornburg
- Garrett Crowe

External Sponsors/Mentors:

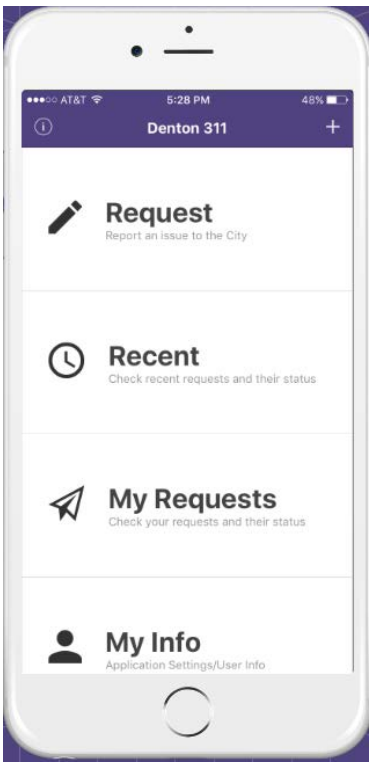
- Habib Abdulrahman (Open Denton)

Internal Sponsors/Mentors:

- David Keathly
- Dr. Bryant

Abstract:

Large cities are complex organizations and it can be difficult for residents to know who to call or what to do in a non-emergency situation. There is a tremendous need for coordination and communication between citizens and the City of Denton to utilize modern technologies in order to better report non-emergency situations. Our project will consist of creating a working prototype 311 mobile application to propose to the City of Denton. This will be an attempt to show the City of Denton that an application like this can be both feasible, and beneficial to the city and its citizens.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Project Aero

Project Aero
By: Fantastic Four

Team Members:

- Alyssa Thurston
- Breuna Riggins
- Travis Goral
- James Sabetti

External Sponsors/Mentors:

- Denton Techmill
  Dan Minshew, danminshew@gmail.com
  Kyle Taylor, kyletaylored@gmail.com

Internal Sponsors/Mentors:

- Professor Keathly

Abstract:

Due to the large amounts of traffic from various highways, many large businesses, and two universities it is quite shocking to find that there is only one air quality sensor in Denton. The next closest is over 15 miles away. Given these facts, we don't know just how bad the air quality is in the city. It is the goal of this project to rectify the lack of air quality data. This project, upon completion, will help the citizens of Denton become publicly aware of the air quality, the standards set by the EPA, and take civic action. This project's innovation is derived from the fact that the data collected is publicly available. Additionally, citizens can elect to create their own sensor and contribute data collected from it.

UNT COLLEGE OF ENGINEERING
EST. 1890

Department of

ELECTRICAL ENGINEERING

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

PLC Test Station

Team Members:

- Ahmed Al Afreed
- Kevin Dempsey
- Billy Matthew
- Mark Matthews

External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- Dr. Tao Yang

Abstract:

The purpose of this project is to design and build a programmable logic controller test station for the use of the Electrical Engineering department at The University of North Texas. This project will be left for future classes to learn from, use, and potentially build onto. Our immediate market resides with the UNT EE department; however, this piece of equipment could potentially benefit other departments that reside within Discovery Park. This project will include research regarding a SCADAPak PLC and the software it uses as well as some Allen Bradley components.
Proficiency in wiring, troubleshooting components, and overall circuit functionality design will be obtained in the completion of this project. The main cabinet will be temperature control, while the secondary feature will show a mixing station.

UNT COLLEGE OF ENGINEERING
EST. 1890

BE-Wind Turbine Data Logging System

Team Members:

- Hussam Alanazi
- Faisal Basmer
- Christopher Berdan
- Nga Nuyen

External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- Dr. Miguel Acevedo

Abstract:

BE-Wind has asked the UNT Electrical Engineering department to design a system to evaluate their EOW2 wind turbine. The system to be designed must be able to measure the angular velocity of both turbine blades, the local wind speed effecting the turbine, and the voltage and current produced by the turbine. These variables must all be collected and correlated in order to analyze the power produced by the turbine at different wind speeds. The purpose is to provide accurate power and performance curves of the wind turbine. A data logger system will be designed and used to gather all the variables and time stamp the information in a format that can show performance over time. This will allow BE-Wind to apply the data to their power conversion systems in order to improve performance. The final design will be an off-grid system involving an anemometer, photo-optic sensors, a current sensor utilizing the Hall-effect, and a DC voltage transformer.

UNT COLLEGE OF ENGINEERING
EST. 1890

Smart Irrigation System

Team Members:

- Hussain Aldawsari
- Nawaf Alraddadi
- Fawaz Alsagheer

External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- Dr. Parthasarathy Guturu

Abstract:

Our senior project is basically to design and develop a smart irrigation system employing WSN (XBee) concept and using WiFi-module. The design of our system is based on a microcontroller (Arduino) that is used to process the reading values obtained from the soil moisture sensor and sent by XBee (RX) to the other XBee (RX). As a result, it will either irrigate the plants by turning the water pump on or off according to the received set of data. The purpose of using WiFi-module is to enable us monitoring the system wirelessly from anywhere.

UNT COLLEGE OF ENGINEERING
EST. 1890

Wireless Charging System

Team Members:

- Hussen Aldhelep
- Hassan Alghazwi
- Hassan Alkhodar

External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- Dr. Parthasarathy Guturu

Abstract:

With cell phones turning into a fundamental piece of life, charging the batteries of these cell phones might be a problem. Each phone's manufacture produces different types of phones and batteries. Eventually, all these batteries needed to be charged. Therefore, the main objective of this current proposal is to make charging cell phones much easier. On the other hand, there are some disadvantages for this project such as: Slower charging, more expensive, and Inefficiency. However, the main reason of this project is to help people to charge their phones without plugging in the USB cable in their phones. Thus, in this project, we are going to build a wireless cellphone charger and test it with using some of the lessons that we have learned in engineering classes. The Pspice software will be also used to simulate the circuit. After we build the circuit on a breadboard, we will transfer the working circuit to a PCB. The components we are using in this project are: HF-Transformer, 2 Inductor Coils, Rectifier, Capacitors, Transistors, HF-diodes, and Voltage regulator. Converting the volte from 230V AC to 12 V DC is going to be done by using high frequency transformer. The full bridge rectifier that would wirelessly receive the AC signal and then turn it back into DC power to charge the cellphone. We are transferring current and we need to limit it because there's a fixed amount of current that batteries can handle. Transistors are going to be used for this job. The voltage regulator is an essential component to control and stabilize the output voltage of the rectifier in the receiver. The rectifier is one of the main components of the receiver. It uses high-frequency power to generate DC power.

UNT COLLEGE OF ENGINEERING
EST. 1890

Neural Recording System

Team Members:

- Abdulrahman Alraimi
- Joshua Maddux
- Kelechi Ubani

External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- Dr. Ifana Mahbub

Abstract:

A neural recoding system is composed of several micro devices that allow the user to record neural signals emanating from the human body with the help of wires, process the signals received, then store this decoded data from processed signals for further study. While the neural recording system is helpful, constructing an efficient system can be difficult.

For this senior design project, we want to develop an energy efficient wireless neural signal processing system for neural prosthetic applications. We will focus on three main objectives. First, we want to make this system wireless. This will allow us to transmit data from our analog to digital microcontroller to our signal processing system to prevent any risk of using wires. Second, as mentioned before, we will create an energy efficient system with the addition of the wireless aspect. This wireless aspect will allow us to control the transmitter and receiver through sleep-wake functionality to converse energy while maintaining a low power consumption for our micro devices. Lastly, we will develop an algorithm for spike detection and sorting. Spike detection and sorting is achieved through applications of signal processing by grouping neural spikes based on shape and characteristic using MATLAB.

We can accomplish these objectives in four useful steps. The first step in this algorithm is to perform a band-pass filter. The second step is to establish a threshold for the amplitude peaks for detecting which neural signals are worth processing. This is because some peaks may present itself as too small, in which we can simply ignore those. Then, we move onto our third step to identify and extract the characteristics and features of the neural spikes. These features and characteristics can be the actual shape, size, or frequency. We want to eliminate any random repeated variations.

Lastly, we group the spikes based on their features and characteristics through clustering. Clustering can be achieved through machine learning which will use automatic spike sorting to maximize the algorithm's potential. Once sorted, we can use our computer device for analyzing the final results.

UNT COLLEGE OF ENGINEERING
EST. 1890

Frequency Modulated Continuous Wave Radar System

Team Members:

- Natchanon Boonumpaichaiyakul
- Guy Kouaho
- Noppassorn Sribenrat

External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- Dr. Kamesh Namuduri

Abstract:

Since new technologies have been developed from time to time, more limitations in using technology are overcome. Frequency Modulated Continuous Wave (FMCW) RADAR (Radio Detection and Ranging) has become in use to develop a better device comparing to simple continuous wave radar. This project will develop a low cost and compact device using FMCW RADAR as a remote sensor. This radar system can be used for automotive security and protections applications. The radar must be able to detect and differentiate between moving and static object in the direction of radar. It also can determine speed of the target. MATLAB and DSP (Digital Signal Processing) manipulation will be used in data analysis. Doppler Effect is applied to estimate the distance and velocity. The transmitter of an FMCW radar system sends a linear signal with high frequency and large bandwidth. When the transmitted signal hits target, the target modulates the signal which is reflected toward the receivers. Time delay and a frequency shift (Doppler frequency) of reflected signal depend on the target distance(R)and relative speed.

UNT COLLEGE OF ENGINEERING
EST. 1890

NECTAR AGRICULTURE

Climate Monitoring Module by Circuit Breakers

Team Members:

- Daniel Campagnola
- Seth Markovich
- Eric Mercado
- Peyton Strain

External Sponsors/Mentors:

- Nectar Agriculture

Internal Sponsors/Mentors:

- Dr. Xinrong Li

Abstract:

In the changing world we live in there is a higher demand for effective growing methods. This include food production and nutrition diversity. Nectar Agriculture is developing an environmentally controlled enclosed growing pod with several drawers to grow practically any produce in the same location. Our team is working with Nectar Agriculture to develop a sensor array capable of monitoring the climate of the individual growing drawer inside the pod facility. The climate module is a standalone device with the intent to be integrated into the individual growing drawers of the growing pod Nectar Agriculture is developing.

The primary goals of the climate module are to operate in real time, collect the climate data from the sensors, aggregate the sensor data, send the data to an offsite server for user viewing and long-term storage, and receive commands from an offsite location. The module is being developed on a TM4C1294XL microcontroller board. This microcontroller has onboard networking capabilities making it simpler to communicate to the server. To achieve a real time operating system (RTOS) the microcontroller utilizes TI-RTOS. TI-RTOS also allows us to manage the scheduling and prevent timing conflicts in the systems operation. Environmental parameters monitored by the sensor array are barometric pressure, temperature, carbon dioxide, relative humidity, and particulate matter. Communications with the sensors is achieved through the protocols UART, PWM, and I^2C. Each drawer the climate module needs to monitor is approximately 12 ft wide, 5 ft deep, and 4 ft high. Data collected from the sensors is aggregated into a package to be sent through the onboard networking port to the offsite server. The offsite server is developed by Nectar Agricultures.

By reaching all of the primary goals our module will be the ideal component for the growing pod Nectar Agriculture is developing.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Firefighting Emergency Response System

Team Members:

- Jesse Garza
- Connor Gillispie
- Lemuel Hadnot

External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- Dr. Kamesh Namuduri

Abstract:

The mission of this project is to mitigate the challenges that firefighters face everyday when putting their lives on the line to protect those in need. The challenges that firefighters face on a day to day basis are fire behavioral changes, lack of staffing, and most importantly and what we will be focusing on in this project, communication. The survival of many firefighters is dependent upon the exchange of information, which can often be affected by the building type, the environment (especially noisy environments both acoustically and electronically), and the type of communication systems that they have. Firefighters do not have the same kind of funding that the police have, and some fire departments are volunteering jobs so they will need a cost-effective solution as well as a reliable one.

In the previous semester in our Senior Design I project, we collaborated with a Senior Design II group to create a Firefighter Emergency Response System. The goal of this system is to assist firefighters in performing their duties effectively and safely in emergency situations using sensors that will be portable and will be carried on the firefighter's person that will send information wirelessly to a base station that will record data from those sensors in a central database. The sensors that we have implemented includes a GPS Sensor, a heart rate sensor, and a temperature sensor. These sensors will connect to a Raspberry Pi Zero that will read the data that will send it to the Raspberry Pi main base via WiFi. We have implemented a mesh network that will enable the Raspberry Pis to talk to one another.

For our second semester, we plan to implement a moving vehicle to the system that will be equipped with GPS trackers, in order to expedite assistance to the firefighters and help dispatchers direct those vehicles to where they are needed. We also plan to replace the mesh network, which was previously our means of communication between signals and main base, and implement a Low-Power Wide-Area Network (LORA) in order to extend the capabilities of the device to remote areas.

UNT COLLEGE OF ENGINEERING
EST. 1890

GPS Estimation for Unmanned Aerial Vehicles using Kalman Filtering and Neural Networks

Team Members:

- Dustin Howe
- Joseph Kurilla
- Michael Walton

External Sponsors/Mentors:

- N/A

Internal Sponsors/Mentors:

- Dr. Kamesh Namuduri

Abstract:

This document summarizes the proposed project to develop a GPS estimation system for unmanned autonomous vehicles (UAV). We will address problem to be solved, the proposed design, and define the deliverables

The signal from a global positioning satellite (GPS) module to the flight controller of a UAV is necessary for autonomous flight. The signal is used by the flight controller to follow predetermined flight paths and maintain position and heading. There are places such as between large buildings or indoor areas where GPS signal is degraded or denied. If the GPS signal is lost even for a few seconds, the drone will be unable to navigate. To remedy such an event, we will develop a system that estimates GPS coordinates by taking inputs from an inertial measuring unit (IMU) and calculating position change.

Because the IMU is susceptible to error from noise, we will utilize both a recurrent neural network (RNN) and a kalman filter to calculate the GPS coordinates. A RNN is a neural network that can "remember" previous data, and make predictions based off that data. The kalman filter will makes predictions for both acceleration and position using a mathematical model of the system. During an update phase, the kalman filter will use the difference between the prediction and observed information to update the error model.

The system should weigh less than 3 lbs and be mountable to a drone. It should be able to calculate the GPS coordinates within 2 meters for 10 seconds. GPS calculations should start immediately after the true GPS signal is lost. As an additional requirement of this project, a working prototype will be delivered to the TAMU Corpus Christi testing center by February, 2018.

UNT COLLEGE OF ENGINEERING
EST. 1890

Department of

ENGINEERING TECHNOLOGY

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

SquareBear Mini: Analog/Digital Synthesizer

Team Members:

- Matt Heupel
- Alex McGuinness
- Gelacio Sanchez

External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Dr. Robert Hayes

Abstract:

“Simplistic Design,

Unlimited Potential”

Group SquareBear provides an affordable and portable music synthesizer for experienced as well as beginning music enthusiasts. The SquareBear mini is a compact sound synthesizer utilizing analog and digital technology that enables the user to produce music in remote locations. The hybrid technology takes advantage of the best of analog and digital processing of audio spectrum signals. This product fills a niche market in the vast market of commercial synthesizers by providing port ability and affordability in a compact unit.

UNT COLLEGE OF ENGINEERING
EST. 1890

Tempescope and Weather Station

Team Members:

- Joshua Merryman
- Daren Bessinger
- Juan Lopez

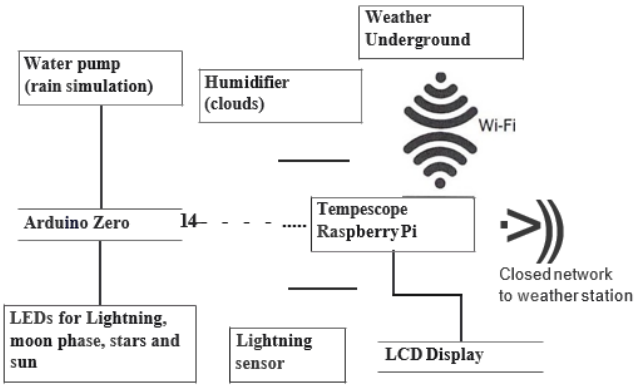
External Sponsors/Mentors:

Internal Sponsors/Mentors:

- Dr. Robert Hayes

Abstract:

A-Team provides a Tempescope/Weather Station that presents a visual display of the weather conditions outside that is accurate and pleasing to the eye. The design makes several improvements to the OpenTempescope which was the brain child for the project. The Tempescope/ Weather Station gives people in places like a hospital room or a cubicle at work a representation of what's happening outside that can improve their work environment. By taking data from a local paired weather station, the Tempescope/ Weather St at ion is accurate to what is actually going on outside. Adding a LCD display to show all the data that can't be simulated complement s the visual display of weather conditions that can be simulated. The addition of more accurate weather data, moon phases, rain intensity, lightning, and more realistic clouds are a few of the added and/or improved aspects to this version of the original OpenTempescope.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Assisted Attic Lift

The Assisted Attic Lift

Team Members:

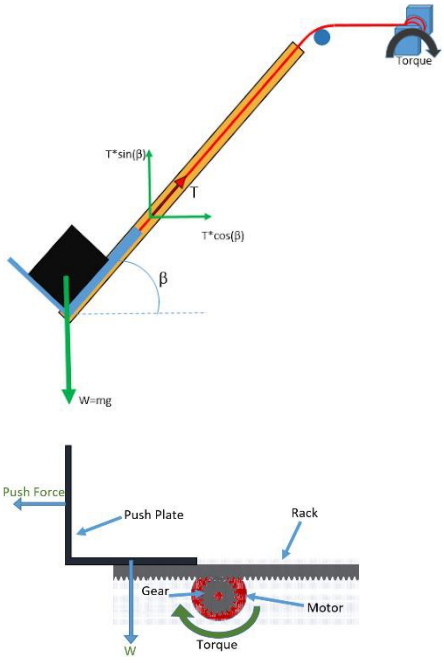
- Ian Wylie
- Samuel Shelton
- Chris Goodman
- Abdulla Aljabr
- Chris Hollingsworth
- Jordan Robertson

External Sponsors/Mentors:

- UNT Department of Engineering Technology (ETEC)

Internal Sponsors/Mentors:

- Professor Ali Nouri
- Professor Leticia Anaya



Abstract:

The Assisted Attic Lift is an attachable system that eases the process of raising heavy items into the attic space of any house. Using an existing attic ladder, the lift system bolts straight on to this ladder, and the push arm is assembled at the attic entrance.

The way this system works starts with an object being placed on the lift cart at the base of the attic ladder. With the push of a button, a winch pulls the cart up the ladder on a track using a steel cable. When the cart has fully ascended into the attic, a push arm pushes the object off the cart into an empty space into the attic with rack and pinion technology. One more push of a button will return the cart to the base of the ladder at its starting position.

Through the funding of the University and the effort given by the students, the Assisted Attic Lift became possible. We hope to see this product be deemed useful and important by contractors, and have it implemented as a common household appliance to ease the lives of homeowners.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

ASHRAE

Project Turbo

Team Members:

- Benjamin Vetters
- Tyler Luce
- Sulaiman Aljurbua
- Jose Valentino
- Peter Caparelli

External Sponsors/Mentors:

- American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

Internal Sponsors/Mentors:

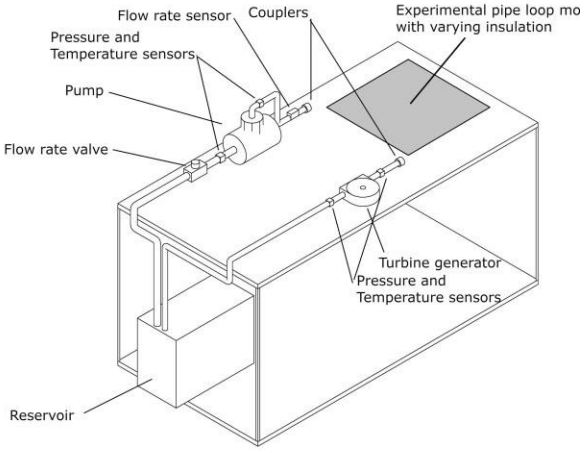
- Dr. Huseyin Bostanci
- Dr. Leticia Anaya

Abstract:

Project Turbo is a mobile lab test bench that will be used at the University of North Texas to assist students in understanding fluid mechanics and heat transfer principles. The proposed project is sponsored by the ASHRAE national organization and will consist of four hands-on labs for students to perform.

The test bench is a closed system that includes pressure gauges, thermocouple temperature sensors, a turbine generator, a pump, a control valve, a flowmeter, interchangeable tubing, and pipe insulation. Students will be using Bernoulli's, Darcy's, and other power equations to determine power added to the fluid by the pump, pump efficiency, energy losses due to a temperature differences, frictional energy losses, power removed by the turbine/generator, and turbine/generator efficiency.

The main objective of Project Turbo is to help students understand hydropower concepts through a user-friendly, hands-on experience workbench.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

JABRR INDUSTRIES

Adaptive Kayak Lift

Team Members:

- Ara Amen
- Brandon Ricky
- Jackson Russo
- Ryan Schwend
- Ricky Villalobos

External Sponsors/Mentors:

- Turning Point Nation

Internal Sponsors/Mentors:

- Professor Ali Nouri

Abstract:

Jabbr industries' goal is to help people with limited mobility enjoy outdoor recreational activities. We have partnered with Turning Point Nation which is an organization who assists disabled veterans enjoy outdoor activities. Together we can help everyone live life without obstacles.

The Adaptive Kayak Lift is a lift that is easily accessible for someone in a wheelchair to both load and unload the kayaks onto any level of the trailer. Eliminating this difficulty will allow for Turning Point Nation to achieve their inspiring goal of teaching those living with mobility impairments how to indulge in exciting outdoor activities without any obstacles

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

OZONE RELIEF SYSTEMS

Ozone Relief Systems

Team Members:

- Omar Aguirre
- Meshal Aldulaijan
- Andrew Bryant
- Aaron Wilson
- Jerry Young

External Sponsors/Mentors:

- UNT Department of Engineering Technology (ETEC)

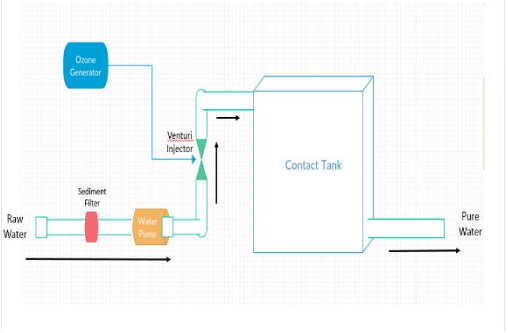
Internal Sponsors/Mentors:

- Dr. Seifollah Nasrazadani

Abstract:

This project presents the design of a disaster relief water purification system. The design was developed with careful consideration of the operational problems experienced with most ozone generators available worldwide.

By keeping track of the water input, the ozone generator is able to cleanse and disinfect using an electrical discharge. In doing so, many special features have been incorporated which are reflected in the equipment's proven performance and reliability. This design has several potential applications, including mobile water treatment systems which provide supplemental water to handle short-term water shortages or meet peak demand.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

UNT Tolerance Analysis

Team Members:

- Terrance English
- Nathan Peitzer
- Nathan Schami
- **Justin Hollingsworth**

External Sponsors/Mentors:

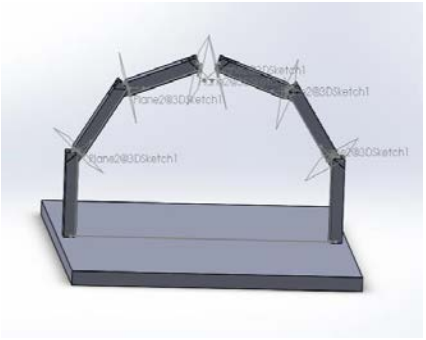
- Raytheon

Internal Sponsors/Mentors:

- Dr. Leticia H. Anaya

Abstract:

3D Tolerance Analysis of a mechanical assembly benefits manufacturers and engineers in every phase in the design process. The tolerance analysis of a product can predict a design's functionality. However, a design cannot often determine its tolerances. Advances in technology have brought software that can perform these tasks so products with design defects can be tested before sending the final assembled product to be manufactured. Our team will gather various information about different tolerance analysis software, such as its strengths and weaknesses. The information will be used to create a matrix of product features to rank the functions of a product.



The team will also perform comparative analysis between the tolerance performance of a software designed robotics arms prototype and the tolerance performance of an actual physically developed robotics arms prototype. A two level six factorial ($2^{\wedge 6}$) testing plan will be used to analyze certain gap distances created by the assembled prototype. In the $2^{\wedge 6}$ layout, a six bar assembly will be tested with each bar at two levels (maximum and minimum tolerance values) to determine the impact of accumulated variation on certain gap distances (or the response values) of the prototype.

The goal is to determine the discrepancies between the actual software results and the actual physical implementation. Variables such as (atmospheric heat, pressure, material, part lengths, etc.) that potentially affect the gaps will be not considered. It is expected that the location of the parts in the assembly will have an impact on certain gap distances

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

UPLIFT ENGINEERS

The Outdoor Lift System

Team Members:

- Owen Griffin
- Christian Veliz
- Edwardo Chavez
- Charles Priest II

External Sponsors/Mentors:

- Turning Point Nation

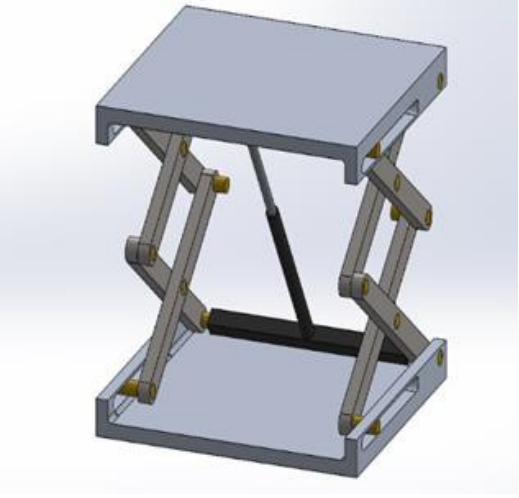
Internal Sponsors/Mentors:

- Dr. Hector Siller

Abstract:

Uplift Engineers is a group of Senior Mechanical Technology engineering students working together to create the Outdoor Lift system. The Outdoor Lift System is a hydraulic lift device that is used in outdoor environments to lift mobility impaired persons in wheelchairs in order to give them the ability to easily transfer from the ground to a vertically elevated surface or location while engaged in outdoor activities. The sponsor for this project is the Turning Point Nation organization.

Turing point's mission is to encourage and teach mobility impaired persons the skills to engage in outdoor activities through the use organized outdoor events hosted by the company. To this extent we were asked to build this device to help facilitate some of the activities engage in these outdoor events. Because one of our member's wife engages with mobility impaired people on a regular basis and another one of our members was in a severe accident. We as a group have a vested interest in this project and the positive effect that this project can have on mobility impaired people who are trying to engage in outdoor activities. As well as the opportunity it gives newer mobility impaired people who want to learn and engage in these outdoor activities.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Infrared Chip Engraving Laser

Team Members:

- James Burg
- Rojelio Cavazos
- Brian Glass
- Andrew Guidry
- Andrew Murgia

External Sponsors/Mentors:

- L-3 Technologies

Internal Sponsors/Mentors:

- Dr. Maurizio Manzo

Abstract:

The proposed project from L-3 Technologies is to change the current process of labeling infrared chips from placing stickers with barcodes to using an automated laser system to engrave the barcode. A laser engraved barcode is more permanent, cheaper, and reduces human error. The laser system will be used to engrave a 2D barcode that must be verifiable via an integrated reader after engraving by repurposing a soldering table.

The system must insure the integrity of the barcode, be as automated as possible, perform an automated process shutdown if read back verification fails, and allow for manual intervention in case of verification failure or safety issues. The barcode cannot damage the product, degrade the performance of the sensor, damage the focal plane array, block any infrared energy, or show as a blemish in the final imaging system. The system must adhere to all local, state, and federal safety requirements for low energy laser operation.

Senior Design Day 2018

UNT Formula SAE – Power Integration

Team Members:

- Nick Kalil
- Seung Cheon

External Sponsors/Mentors:

- Altus Well Experts
- SolidWorks
- College of Engineering

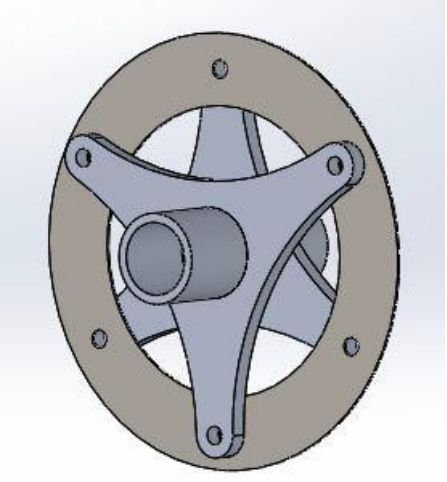
Internal Sponsors/Mentors:

- Dr. Hector Siller

Abstract:

The newly formed sub-group of UNT SAE, Power Integration, has been given the responsibility of being UNT SAE's first ever research and development project for future active members. Power Integration's first project is to find an applicable way to replace, or redesign, existing continuous velocity (CV) joints located on the rear axel of the racecar.

This team's goal for their current Flex Plate and Coupler design is to create a cost and weight savings for the SAE team and provide any important limits of the prototype. SolidWorks, a type of computer-aided design (CAD) software, is used to precisely design the flex plates and coupler components to meet design specifications provided by other UNT SAE sub-groups. Extensive finite element analysis (FEA), and hand calculations are then used to test how the design responds to loads and torques and any other physical effects. This team was able to work with many sub-groups from UNT SAE's Formula team to provide a strong foundation for future members to build off and implement on future UNT SAE Formula racecars.



UNT COLLEGE OF ENGINEERING
EST. 1890

Eagle Solutions-Proposal Stage

Team Members:

- Abdulsalam Alanazi
- Yazeed Alanazi
- Justin Brown
- Leta McCabe
- Christian Nelson

External Sponsors/Mentors:

- ATE Technologies Inc

Internal Sponsors/Mentors:

- Dr. Leticia Anaya

Abstract:

ATE Technologies processes semiconductor wafers. Currently, their laminator machine takes too much time and wastes too much materials during this process. Additionally, the location of the control panel and gauges can result in back strain and missed readouts.

Our team will be overhauling the cutting steps of this machine. Presently, stage one cuts the tape in a set diameter regardless of the size of the wafer. Stage two uses a spring-tension current wire to cut the tape to exact dimensions of the wafer. The new design will remove both stages and replace with a single, free-floating, cutter mounted to linear tracks. This will allow the tape to be cut to precise measurements on the first pass. Finally, we will be relocating the control panel and gauges to a more ergonomic position instead of below waist height.

UNT COLLEGE OF ENGINEERING
EST. 1890

Rogers-O'Brien CONSTRUCTION

The STARHOUSE

Team Members:

- Chasin Allen
- Lorne Glenn
- Jacob Bimbi
- John Sakwa

External Sponsors/Mentors:

- Rogers-O'Brien

Internal Sponsors/Mentors:

- Dr. Zhenhua Huang

Abstract:

Purpose Construction, LLC is a group composed of the members John Sakwa, Jacob Bimbi, Chasin Allen, and Lorne Glenn. We have been tasked with working under Rogers-O'Brien to tackle different phases of the construction process. Over the course of several months we have come together to use our construction and engineering skills to deliver a quality and efficient project that will serve Frisco for years to come.

Rogers-O'Brien will be building a 17 story multi-family high rise to share the Frisco skyline with the Omni Frisco and the Ford Center. This structure will house over 150 residents and will include parking, a pool, and engaging amenities for all. The building has over 270,000 sqft of floor space to accommodate for a vast array of unit types.

With the help of Dave Parante, Preconstruction Manager of Rogers-O'Brien, we were able to exercise our skills and talents to make a name for ourselves in our future work industry.

UNT COLLEGE OF ENGINEERING
EST. 1890

TDIndustries

Texas Scottish Rite North Campus Playground Addition

Team Members:

- John Barton
- Phillip McDavid
- Kevin Oates
- Christopher Campbell

External Sponsors/Mentors:

- John Raner
- Andrea Miille

Internal Sponsors/Mentors:

- Dr. Zhenhua Huang

Abstract:

The scope of this proposed project includes the construction of a restroom pavilion, a picnic pavilion, and a wood bench/feature. The construction would take place adjacent to an active playground on the grounds of the Texas Scottish Rite North Campus in Frisco, Texas.

In planning the construction of the proposed project, G2C created a report including an overview of the company business plan along with a comprehensive safety plan. G2C also reviewed the site logistics and layout, preformed a cost estimate, created a schedule, preformed a risk analysis, and wrote a value engineering proposal. Our budget for this project is approximately $500,000.

G2C collaborated with TDIndustries through email and on-site visits to discuss and review the materials prepared for the proposed project. With the assistance of TDIndustries we believe that if the proposed playground additions were to be made, G2C would be successful at delivering the project on time and on budget.

UNT COLLEGE OF ENGINEERING
EST. 1890

VAUGHN CONSTRUCTION

UNT Health Science Center Interdisciplinary Research Building

Team Members:

- Hunter Rose
- Juan Lopez
- Cole Cowden
- Austin Anderson

External Sponsors/Mentors:

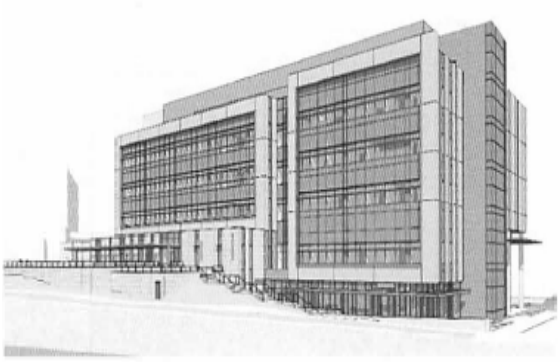
- Vaughn Construction
- Steve Hatcher

Internal Sponsors/Mentors:

- Dr. Cheng Yu

Abstract:

The UNT Health Science Center Interdisciplinary Research Building is located in Fort Worth, Texas at the intersection of Camp Bowie Boulevard and Clifton Street. In the cultural district within walking distance of Kimball Art Museum, Modern Art Museum, and the West 7th shopping and dining center. The project itself is a joint venture between Texas Christian University and The University of North Texas, and will serve as a research and learning center. It will house the North Texas Eye Research Institute, the Institute for Molecular Diagnostic and Therapeutic Development, and the University of North Texas System College of Pharmacy. The project itself is worth $93 million with a two year time frame for completion, Vaughn Construction broke ground October of 2016 and are scheduled to complete November of 2018. The building will house classrooms, teaching laboratories, seminar rooms, and wet and dry research laboratories. The group will concentrate on the 5th level, which consist of 4 laboratories and with a variety of over 30 offices, break rooms and work space. Emphasizing on the a schedule, budget, take-offs, safety plan, risks analysis and logistics along with other tasks needed to complete a construction project.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

US Highway 380 Improvement

Team Members:

- Aniceto Espinoza
- Rodolfo Corral
- Crystal Hernandez
- Cesar Sanchez

External Sponsors/Mentors:

- Coppell Construction Co., Inc

Internal Sponsors/Mentors:

- Dr. Cheng Yu

Abstract:

On July 11, 2017, TXDOT awarded Coppell Construction Company Inc. a contract worth $3,268,105.61. The name of the project is US Highway 380 improvement. It is located in Wise County. The scope of the project includes replacing East Bound bridge deck, overlaying West Bound bridge deck, bridge repair, pavement reconstruction, and pavement markings. The bridge is 1162 feet long. It passes over BNSF railway and FM 730 through Old Greenwood Road. The project has three different phases as follows. Phase 1 is reconstruction of East Bound bridge deck, Phase 2 is overlaying West Bound bridge deck with polymer, and Phase 3 is final stripping and clean-up. The duration of the project is 235 working days. The estimated completion date is January 15, 2019. ARCC construction will concentrate on the schedule, budget, estimates, safety plan, risks analysis, and logistics along with other tasks needed to complete a construction project.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

VAUGHN CONSTRUCTION

UNT Residence Hall 2018

Team Members:

- Zachary Canales
- Dawson Guerrettaz
- Abdul Olisa
- Jose Sandoval

External Sponsors/Mentors:

- Vaughn Construction
- Andrew Thompson

Internal Sponsors/Mentors:

- Dr. Aloysius Attah

Abstract:

Vaughn Construction is not an ordinary -construction company. It focuses on the whole construction process on any project that the company focuses on. They take control of construction projects from start to finish. Vaughn Construction has taken on the project of the 2019 residence hall and tour center. It was started during fall 2017 and is expected to be completed by spring of 2019. This project will include a 120,000 SF residence hall with 500 beds. Along with a separate 22,000 SF tour center building which will host prospective students and parents as they visit and tour the campus as they decide if UNT is the right college for them to pursue a successful career. New Campus Solutions will focus on the schedule, budget, estimates, safety plan, risks analysis, value analysis, sustainability, and logistics.

UNT COLLEGE OF ENGINEERING
EST. 1890

Austin Bridge & Road
An Austin Industries Company

I-30 Bridge Replacement & Road Improvements

Team Members:

- Antonio Guajardo
- Brooke Reed
- Patrick Black
- William Burgess

External Sponsors/Mentors:

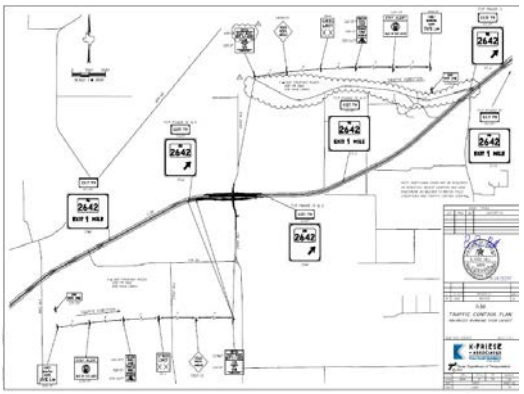
- Austin Bridge & Road
- Lee Pelton

Internal Sponsors/Mentors:

- Dr. Aloysius Attah

Abstract:

The project specifications and contract plans call for the replacement of a bridge and surrounding roads on State Highway 30 at the intersection of FM 2642 in Hunt County. The details supplied by TxDOT require us to install new on-ramps and exit-ramps, and to tear out the existing bridge assembly, frontage roads, main lanes of I-30, and the FM 2642. We are then instructed to install new concrete pavement and asphalt pavement over these road sections. Our team will be working with Austin Bridge and Road, and Lee Pelton with Austin will be our sponsor. Our project team has created the company, "Texas Roadworks", for this project, and Texas Roadworks will be our team name for the project. Texas Roadworks will be creating a project plan that implements all of the lessons and content that we have learned while attending the Construction Engineering Technology (CNET) program. In this project plan, we will be discussing the logistics, schedule, budget, risks, business plan, safety, market analysis, sustainability analysis and value analysis.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

CADENCE MCSHANE CONSTRUCTION

Plano East Senior High School Addition

Team Members:

- Michael Garza
- Moses Midence
- Esther Valero
- Shayn Kaysing

External Sponsors/Mentors:

- Cadence McShane Construction

Internal Sponsors/Mentors:

- Dr. Aloysius Attah

Abstract:

Our senior design project is the Plano East Senior High School Classroom Addition located in Plano, TX. Our project includes the new construction of 24 classrooms, 14 of which will be enclosed by concrete masonry units (CMU's) and serve as a Tornado/Severe weather shelter for that addition of the school. The first level will have 11 classrooms and will be able to hold a total of 291 occupants. The second level will have 12 classrooms holding 268 occupants. It will feature an assembly area complete with presentation area that is capable of holding an additional 127 occupants for a grand total of 686 occupants between the two levels.

The Tornado/Severe weather shelter area is part of the 2015 International Building Code Group E, Section 423.4. Normally, the International Code Council's 500 gives construction requirements and designs for a "safe room" during severe weather. The IBC's latest version now specifically mandates that areas where wind speeds can reach up 250 MPH are required to have this shelter. This is a huge step in keeping the students and faculty safe during events that can frequent the North Texas area. The campus will also be able to enjoy a new walking path that will run between an existing pond on the South side of the campus and join at the steps of an existing building as well.

Our project team is tasked with creating a project report that aligns with the design project. The sections covered will include: Logistics and Layout, Budget, Schedule, Sustainability, Value Analysis, Risk Assessment, Safety Plan, Business Plan, and Computer Modeling program such as BIM.

UNT COLLEGE OF ENGINEERING
EST. 1890

Department of

MATERIALS SCIENCE AND ENGINEERING

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Design of a Process to Solid State Diffusion Bond SiC to B_4C

Team Members:

- Laura Mello
- Neil MacDonald
- Hunter Lide

External Sponsors/Mentors:

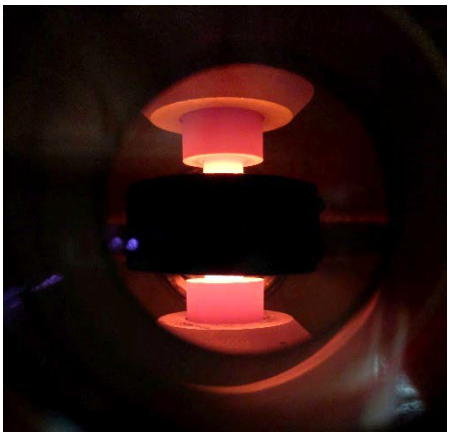
- MTSE sponsored

Internal Sponsors/Mentors:

- Dr. Thomas Scharf
- Department of Materials Science and Engineering

Abstract:

Current lightweight body armor distributes forces over a large area to decrease localized impact. A better way to reduce impact, however, would be to deflect forces laterally rather than longitudinally. By joining two ceramics of differing coefficients of thermal expansion, in-plane stresses will release forces laterally upon impact. This design utilizes the Spark Plasma Sintering (SPS) method to successfully bond a silicon carbide (SiC) pellet to a boron tetracarbide (B_4C) pellet with minimal cracking. The in-plane stresses created by their different coefficients of thermal expansion have been optimized by inserting a refractory metal foil interface between the ceramics. The approach for designing the SPS process was to vary the processing parameters based on data from literature as well as the experimental results. The criteria for a successful bond consist of minimal cracking and meeting specific values for flexural strength and hardness.



Special thanks to William Rubink, Dr. Thomas Scharf, and Dr. Nigel Shepherd

UNT COLLEGE OF ENGINEERING
EST. 1890

Design of Materials for Firefighting Gloves for First Responders

Team Members:

- Kaylie Sheehan
- Jessica Lanier
- William Eiland

External Sponsors/Mentors:

- MTSE sponsored

Internal Sponsors/Mentors:

- Dr. Witold Brostow

Abstract:

When on the job, firefighters are exposed to extreme heat and the possibility of punctures and cuts. While protecting the entire body from the elements is a necessity, the hands are the first parts of the body going into the flames. If not wearing appropriate protective equipment, the hands can burn and, at the extreme temperatures in flames, the hands can become permanently disfigured. The current gloves used are made of mostly Kevlar or leather. They protect hands from shrapnel, puncture, and tears; however, they do not protect the hands enough, as they are designed for dexterity and motion, with just enough heat resistance. The new glove materials, when used in a glove, will enable the wearers to save more people, land, and property, as they will give the wearer the ability to navigate more environments. The outer layer, being impermeable to liquids and abrasion resistant, will prevent toxins from getting trapped in the gloves.

Current gloves were reviewed and their properties were determined, then a literature review was performed to find materials or composites that were described to have desired properties. Once selected, the materials went through the same tests as the original gloves for comparison. This approach was successful, as the materials found work comparable to better compared to the current gloves.

We would like to thank Allison Osmanson for her help in guiding us through this project, Gregory Granowski for helping us learn to use the machines in the lab, and the entirety of the Laboratory of Advanced Polymers and Optimized Materials (LAPOM) for allowing us the use of their facility. Additionally, we would like to thank Dr. Nigel Shepherd for his assistance throughout, and the guidance he provided us.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Design of a Plasma Based Oxygen Pumping Process for High Vacuum

Team Members:

- Garrett, Simpson
- Roman, Gruszecki

External Sponsors/Mentors:

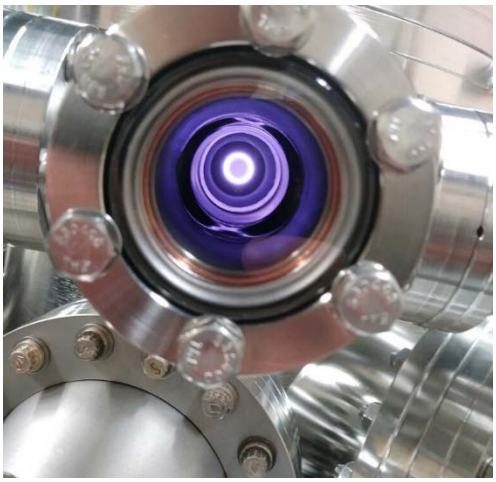
- MTSE sponsored project

Internal Sponsors/Mentors:

- Dr. Nigel Shepherd

Abstract:

2-D transition metal Dichalcogenides such as WS_2 could be the future of electronic transistor devices because of their tunable bandgaps, high mobility and 2D carrier transport. The problem is that these materials, having high surface area to volume ratios, undergo oxidation, including during growth, which alters their chemical structure and electronic properties. The current approach to create ultra-high vacuum uses turbo-molecular and ion pumps. Ion pumps work by ionizing gas molecules that are then accelerated toward a grounded Titanium cathode plate. When the gas ions collide with the plate, Titanium atoms are sputtered from the surface, forming stable chemical compounds with reactive gas particles. This pumping process is dependent upon the transport of gas particles into the ion-pump. Our design makes the Titanium more reactive and increases reaction collisions by creating a Titanium plasma using a magnetron sputtering gun. The plasma occupies the whole vacuum chamber and is able to react with the residual gas species, which more effectively and efficiently pumps the environment.



Dr. Nigel Shepherd provided the lab space, project components, and professional expertise required for this design project. Special thanks to the UNT Materials Science and Engineering faculty members for their constructive criticism, which was instrumental in the development of this design project.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Entegris | POCO GRAPHITE An Entegris Company

Design of a Corrosion Measurement System of SiC at High Temperatures

Team Members:

- Adam Cunningham
- Tyler Hunt
- Samantha Zellner

External Sponsors/Mentors:

- Chris Yannetta, POCO Graphite
- POCO Graphite

Internal Sponsors/Mentors:

- Dr. Rick Reidy

Abstract:

Ceramics can corrode in high temperature and gaseous environments. For example, SiC, which can be used for high temperature electronics as a high band-gap semiconductor, will form SiO or SiO2 in oxidizing environments. This corrosion will drastically reduce its electrical properties. To study the corrosion in certain ceramics and in certain environments (such as SiC in oxygen gas), it is crucial to measure the ceramic's resistance to corrosion and oxidation as a function of oxygen concentration and temperature.

This goal of this project is to design an apparatus that will effectively measure corrosion and/or mass change of different ceramics (such as SiC) under a high temperature and gaseous environment. This project will study the oxidation reactions of SiC at high temperatures to determine the property changes as a result of corrosive reactions.

Our team would like to acknowledge and thank all of our sponsors and mentors, both internal and external. We would also like to extend additional thanks to the UNT College of Engineering, the Department of Materials Science, and the Materials Research Facilities for their support.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Growth of Wear Resistant UNCD Films

Team Members:

- Shomari, Cotton
- Jon Vincent, Callirgos

External Sponsors/Mentors:

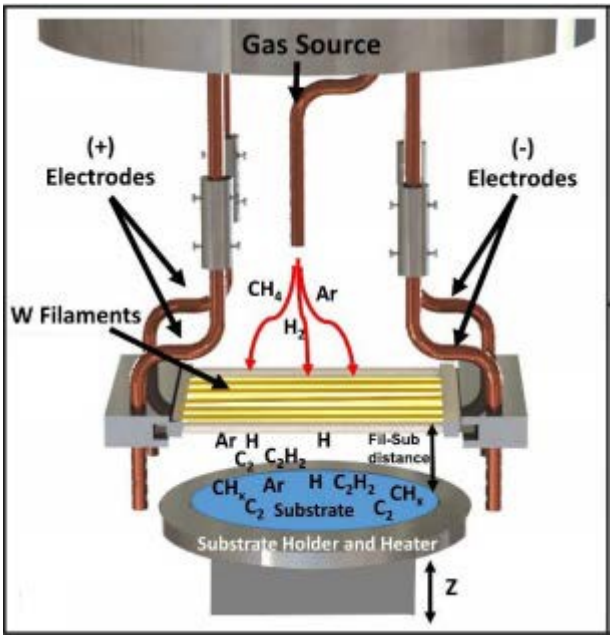
- MTSE Sponsored

Internal Sponsors/Mentors:

- Dr. Diana Berman (Advisor)

Abstract:

The wear of materials that are in constant contact with each other will require the replacement of parts. One way to slow the rate of wear is to apply a coating on the material to improve the product life, which decreases the cost of maintenance. Ultrananocrystalline Diamond (UNCD) films have been shown to greatly decrease the coefficient of friction during abrasive wear. UNCD is different from other diamond-like coatings due to its unique sp^2 sp^3 hybridization and smooth surface roughness. Our Senior Design is to create UNCD coatings by Hot Filament Chemical Vapor Deposition (HFCVD) and characterize the wear of the samples once a coating has been applied.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Design of Irradiation Resistant High Entropy Alloys

Team Members:

- Jessica Reeder
- Sofia Sheikh
- Sarah Williams

External Sponsors/Mentors:

- MTSE sponsored

Internal Sponsors/Mentors:

- Sponsor: Materials Science and Engineering Department
- Mentor: Dr. Sundeep Mukherjee

Abstract:

Nuclear reactors are used to produce and control the release of energy. Many nuclear reactors have a life span of 30 to 40 years due to the degradation of stainless steel. Therefore, there is a growing demand for irradiation resistant alloys to increase the life span of nuclear reactors. High entropy alloys (HEAs) are the new type of metal alloys that are being considered for next generation nuclear reactors, specifically for the reactor vessel. The alloys that we considered for the design are FeCoCrMnNi and $Al_{0.1}$CoCrMnNiwhich were heat treated at 900 degrees Celsius for 24 hours. A matrix was used to compare the structure and properties of both these alloys and stainless steel before and after irradiation to determine which alloy is a better structural material for next generation nuclear reactors. The characterization techniques used to assess the structural and mechanical properties were scanning electron microscopy (SEM), X – ray diffraction (XRD) and nanoindentation hardness testing. The results showed that the HEAs were more irradiation resistant than the stainless steel, specifically the FeCoCrNiMn.

Our group would like to acknowledge Dr. Aditya Ayyagari for his help in ordering the alloy, helping with characterization testing and working with SRIM, Dr. Ovidiu Toader for helping the group understand radiation testing and provide the details of radiation testing as well as running the radiation testing, Ms. Ashley Parson for helping the group purchase items for the project, MTSE Faculty and Dr. Shepherd for giving us constructive feedback to help the group improve, Saideep Muskeri and Vahid Hasanneimi for helping with the nanoindentation testing and Dr. Sundeep Mukherjee for being a great advisor and helping us through the project

UNT COLLEGE OF ENGINEERING
EST. 1890

Design of Bioactive Glass Coatings on Titanium Alloy-Based Medical Implants

Team Members:

- Brandon Ohl, Spencer Taylor, & Ty Thomas

External Sponsors/Mentors:

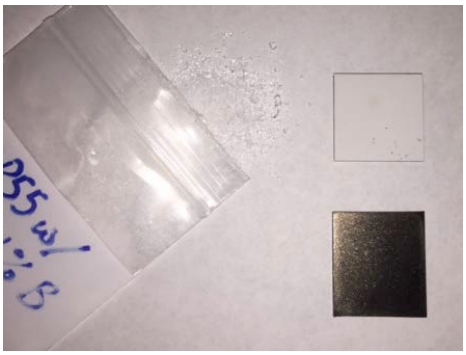
- MTSE sponsored.

Internal Sponsors/Mentors:

- Dr. Jincheng Du

Abstract:

Current metal load-bearing bio-implants form a weak interface with bone, resulting in damaged tissue and inflammation at the interface. Coating these metal implants with a bioactive glass layer can solve this problem by creating a stronger interface between the metal and bone. Bioglass, the original bioactive glass, is not adherent to Ti6Al4V, a metal commonly used in orthopedic implants. Thus, bioactive glasses that adhere to Ti6Al4V are favorable to Bioglass in implant applications. In this project, bioactive glass 6P55 with the addition of 5 mol.% boron was adhered to a Ti6Al4V substrate. Ti6Al4V was coated with glass powder of particle size <20um via suspension coating, and an adherent glass layer was produced after sintering at 800C for 1 minute. The bioactivity of the glass composition was confirmed using FTIR ATR and SEM after being submerged in a simulated body fluid (SBF), as well as molecular dynamic simulations. The successful bonding of bioactive glass to Ti6Al4V suggests that coating orthopedic implants may be a viable option in biomedical use.



A special thanks to Dr. Jincheng Du, Xiaonan Lu, Po-Hsuen Kuo, Dr. Lu Deng, and Roberto Recuero.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

TOSOH

‘Big Boss’ - Designing a Process for Laser Additively Manufactured Biomedical Alloys

Team Members:

- David Flannery
- Sheena Valentin
- Whitley Green

External Sponsors/Mentors:

- Dr. Eugene Ivanov, TOSOH Corporation

Internal Sponsors/Mentors:

- Dr. Rajarshi Banerjee, Professor

Abstract:

The future of biomedical alloys demands new materials that can satisfy the mechanical and chemical requirements of the human body for longer lifespans. TNZT (Titanium-Niobium-Zirconium-Tantalum) is one such alloy that has been shown to exhibit both good mechanical properties (low modulus, moderate strength and ductility) with good corrosion and biocompatibility properties. By designing a process that uses TNZT in a Laser Additive manufacturing process, custom parts with superior properties and wear characteristics can be made for the unique geometries of any patient. This process will use different travel speeds of the laser head which will directly affect the amount of laser energy directed to the localized area during deposition. Our aim is to positively impact both the biomedical and additive manufacturing communities by providing examples from which this Titanium based alloy can be better understood. We will show through tensile bar samples, electrochemical impedance results, and porosity measurements how our process affects the final built part.

We would also like to extend our thanks and acknowledge all of the supporting faculty and students here at the Materials Science Department of UNT. To include Dr. Sameehan Joshi and Dr. Thomas Ho.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Department of

MECHANICAL AND ENERGY ENGINEERING

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

The Auto-Trache presented by The Auto-Trache Partnership

Team Members:

- Robin Michaux
- Mahdi Abu Hasirah
- Marc Pasquale
- Ryan Bishop
- Cameron Garman

External Sponsors/Mentors:

- The Auto-Trache Partnership

Internal Sponsors/Mentors:

- The team is self-funded by its members

Abstract:

The Auto-Trache is an emergency medical device that trivializes the tracheotomy process, allowing for rapid implementation even by individuals with no medical training. The simple operation allows someone to use it on themselves if the situation demands.

A constricted airway encountered by choking individuals, anaphylactic shock sufferers, and other victims must be cleared immediately to prevent death. When the Heimlich maneuver is insufficient, the only alternative is a tracheotomy. Untrained individuals are likely to cause harm when performing a traditional tracheotomy. The Auto-Trache device reduces the chance of unintended trauma, increasing the odds of survival.

Blocked airways can occur during surgery, leading doctors to perform tracheotomies mid-operation. When oxygen is cutoff from the brain, seconds matter. The Auto-Trache's ability to breach the throat and open an airway near-instantaneously gives doctors an edge.

Auto-Trache, because every second counts.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

BE-Wind

BE Wind Turbine

Team Members:

- Dakota Miller
- Abid Sardar
- Mathew Ngao
- Shuai Ju
- Abayomi Adediran

External Sponsors/Mentors:

- Michael Berdan CEO BE-WIND

Internal Sponsors/Mentors:

- Dr. Mark Wasikowski
- Dr. Weihuan Zhao

Abstract:

With an increasing interest within society in alternative energies, the BE-Wind turbine is a small vertical axis wind turbine that can fill some of the future need for energy production. The purpose of this project is to make modifications to the turbine that will make it more efficient.

By changing the aerodynamics of the front facing shield and adding a weather-vane to allow for a better turn speed of the turbine we hope to achieve this increase in efficiency.

The size of these turbines allow them to be placed in much more urban settings. With better availability for locations and an increased efficiency in power production, these turbines will be a good solution for those who wish to help with reducing the carbon emissions we currently produce.

Special thanks to Allen Meyer from Meyer Custom Machining and Fabrication for his help and advice.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Brewer Science

brewer science

Team Members:

- Andy Chao
- Loek Hartjes
- Alex Powell
- Matthew Thompson
- Hayden Hendrix

External Sponsors/Mentors:

- Brewer Science

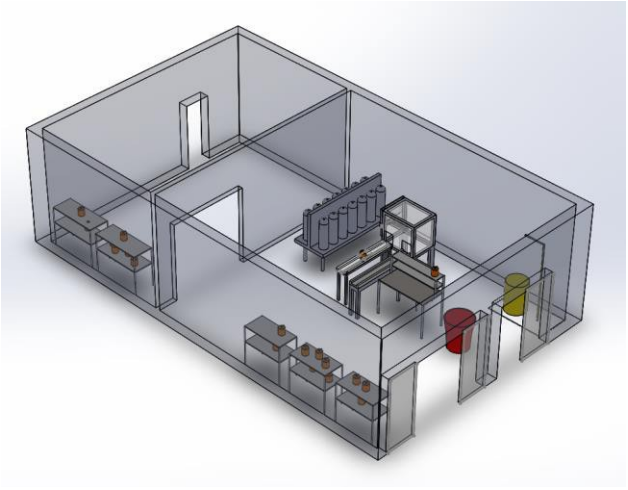
Internal Sponsors/Mentors:

- Dr. Mark Wasikowski
- Dr. Haifeng Zhang

Abstract:

Our project with Brewer Science involves improving their lithography chemical bottling operation via automation. We are confined within cleanroom, OSHA, and physical constraints when considering improvements to their current process. The main goal of the project is to cut down on the amount of human input needed to perform the bottling operation. Brewer Science's current machine is designed to do three functions, decapping, filling, and recapping the bottle. However, only one of these functions are done in the machine that they use currently, which is filling. The other two operations are currently done by hand because they do not function properly, and therefore are very time consuming. The bottles must also be labeled and scanned prior to entering the machine. These two functions are also done by hand.

We have identified a number of points in the process where we believe that time could be reduced. Several solutions have been developed that we believe will be able to cut back on the downtime that the current operation faces in addition to proposing a parameter modification in the control system that oversees the operation. We hope that Brewer Science will utilize or improve upon the solutions that we have provided for their operation.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

C&S PROPELLER

C & S Propeller/ Race Cover & Oversized Bushing

Team Members:

- Majid Alotaibi
- Logan Kurtulus
- Michael Green
- Danys Reyes
- John Smith

External Sponsors/Mentors:

- C & S Propeller
- Pacific Propeller International
- Buddy Tobin (Vice President)
- Brian Riffle (Engineering Contact)

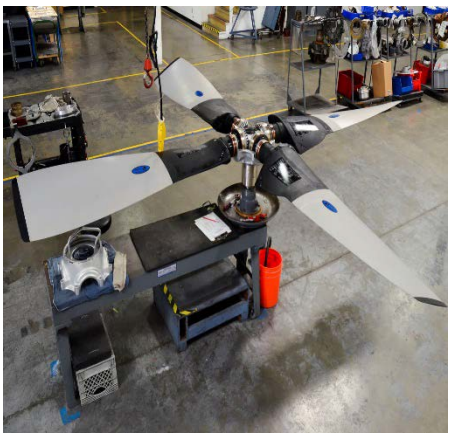
Internal Sponsors/Mentors:

- Dr. Reid
- Dr. Huo
- Dr. Wasikowski

Abstract:

C&S Propeller specializes on maintenance, repair, and overhaul of the 54H60 propeller system. Our project consists of resolving two separate problems during the overhaul process. First, we must design a race protection cover that will resist etch and corrosive chemicals. Currently, the technicians are manually taping every inch of the ring, which is a very tedious and time consuming process. Our goal is to design a cover that is lightweight, easy to handle, and most importantly able keep the ring completely dry. With the use of this ring protection cover, we will reduce the time is takes to prepare the ring before FPI and anodizing processes.

Second, we must run stress analysis on the press fit bushing that transmits high torsional loads from the hub to the blade. Technicians are currently reaming the taper bore press fit area and scrapping the whole blade after becoming out of tolerance on critical dimensions. The goal of our analysis is to design an oversized tapered bushing that will meet all military/FAA standards. With the use of this bushing, we save a very expensive blade from being scrapped and adding an additional flight life cycle for each overhauled blade.



Deer Blind

Team Members:

- Josh Kinnear
- Clayton Lawson
- Derrick Clinton II

External Sponsors/Mentors:

- Mark Wasikowski

Internal Sponsors/Mentors:

- Josh Kinnear

Abstract:

The problem we are solving is making the Deer Blind Mobile and more accessible to the handicap or older hunters who may not be able to use a tall ladder. We also aimed to lift the mechanical system as quietly as possible, while using less force to lift the scissor system than traditional lifts.

UNT COLLEGE OF ENGINEERING
EST. 1890

EXPERIENCED EFFECTIVE EFFICIENT

E3 Entegral Solutions

Team Members:

- Casey McKeever
- Colton Hinnrichs
- Erik Chavez
- Hammad Abbasi
- Matthew Pratt

External Sponsors/Mentors:

- E3 Entegral Solutions
- Josh Combs P.E, VP of Engineering

Internal Sponsors/Mentors:

- Josh Combs P.E, VP of Engineering
- Vish Prasad, Ph. D., UNT Faculty Advisor
- Mark Wasikowski, Ph.D., UNT Faculty Advisor

Abstract:

One may believe a building is always operating the most efficient way, however that is not always the case. Some facilities are not properly commissioned or do not have their energy data analyzed frequently. The result, the facility's equipment becomes less efficient and continues to accumulate excess energy. One of the best ways to lower energy consumption and operational cost in a building is to perform an energy audit, and determine how a facility can become more efficient by implementing energy conservation measurements(ECM). Our senior design group was determined to help the University of North Texas by creating a utility assessment report (UAR). A UAR is a report which includes the facility's current energy consumption, a list of ECMs that would benefit the facility, and the total energy saving after ECMs are implemented. E3 contacted the University of North Texas to discuss this senior design project and UNT agreed to provide the Business Leadership Building for this project. UNT assigned E3 the Business Leadership Building (BLB) due to its high energy usage and need for an energy audit. Our group created a base model using eQuest and an ECM model with ECM's implemented. One of our goals is to demonstrate that a fairly new facility can consume an excessive amount of energy and become more efficient after implementing ECM's.

Special acknowledgment

- E3, Josh Combs, and the entire E3 staff

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

HUBER ENGINEERED WOODS

Huber Engineered Woods: Testing device

Team Members:

- Emily Brooks
- Samuel Lawrence

External Sponsors/Mentors:

- Benny Green

Internal Sponsors/Mentors:

- Dr. Sheldon Shi
- Dr. Mark Wasikowski

Abstract:

We worked with Huber Engineered Wood out of Broken Bow, Oklahoma to create a testing device for ASTM D1037 and PS2-10 Swell Tests that accommodate a larger range of Huber products. Currently the samples that do not fit within the current device are measured by hand. To fulfill the needs of Huber, we went about expanding upon the device that they currently use to allow larger variety of products to be tested. With this redesign, Huber can measure boards up to 2 inches thick with precision and accuracy. The device had to work with current lab set up while also being easy to implement. The Edge Swell testing device is useful to Huber as it allows them to have an elevated level of accuracy and precision for testing samples that have been previously out of size for the current means.

A special thanks to: Robin Shull and Erin Allice

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Team M.U.S.K: Roof Integration

Team Members:

- Armando Alvarado
- Hadi Al Hammam
- Luke Garner
- Estefany Lazo
- Arnaud Ouedraogo

External Sponsors/Mentors:

- Simplified Roofing

Internal Sponsors/Mentors:

- Dr. Shi
- Dr. Wasikowski

Abstract:

There is an emerging problem in the world with the continuous rise of temperature, the planet is becoming warmer and thus the climate is changing. The burning of fossil fuels is the primary source of energy that is used to power the daily functions of our society. There are alternative paths that as a society can be used in order to stop or reverse the damage that has been caused by fossil fuels. The energy provided by the sun is an immense unexploited natural resource that can power the entire word; therefore, the purpose of this project is to help and contribute to emerging technological industries harvesting solar energy as a source of power. Our senior design team is in the process of integrating a solar cell into an existing thermoplastic roof material that is currently installed individually in commercial buildings. The main goal is to make the vast rooftop of commercial buildings harvest the solar energy.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Mechanical Vibration Analysis Demonstrator: Team Vibrations

Team Members:

- Biloff, Zach
- Eloriaga, Lisa Marie
- Petersen, Shayna
- Rojas, Juan
- Zupkov, Lane

External Sponsors/Mentors:

- MEEN Department (UNT)
- AEK Technology (Bob Callender)

Internal Sponsors/Mentors:

- Wasikowski, Mark

Abstract:

The purpose of our project is to create a four bar linkage system that will demonstrate vibration analysis while also demonstrating key mechanical engineering concepts like dynamics and machine elements. Our goal for our project is to be able to reduce the vibration within our system by at least 50%.

Our project serves two purposes:

1. One being that our end result machine will be able to show students 3D concepts MEEN students learn throughout our degree program in actual 3D view
2. Show that within a given mechanical system that we may create in the future, vibration analysis/ isolating vibration within a system is key in the longevity of a machine as well as productivity

We would like to thank Dr. Mark Wasikowski and Bob Callender for all the encouragement and knowledge towards our senior design project.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Micro Forms

Team Members:

- Alondra Pineda
- Chris Hernandez
- Moises Martinez
- Onye Okezie

External Sponsors/Mentors:

- Micro Forms Inc.

Internal Sponsors/Mentors:

- Mark Wasikowski
- Tae-Youl Choi

Abstract:

Micro Forms purchased a camera system that will inspect every part produced. Due to their inefficient lubrication method, too much fluid is splattered onto these cameras, making them inoperable. The goal of our project is to design a lubrication system that can be accurately controlled and improve quality control. The design is innovative because we will repurpose vehicle fuel injectors to spray the lubricating fluid and control them using a programmable logic controller(PLC).

A very special thanks to David Curry, Brad Shelton, and James Francis.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Sponsored by: MultiCam

Project Vader/MultiCam 3

Team Members:

- Aaron Avellanet
- Jose Deleon
- Brandon Locklear
- Ryan Maloney
- Sergio Patino

External Sponsors/Mentors:

- Justin Cormier
- Micah Janzen
- Tony McGrew

Internal Sponsors/Mentors:

- Dr. Hamid Sadat

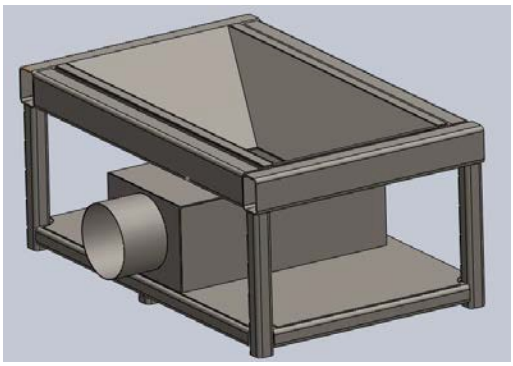
Abstract:

Our task is to redesign the Multicam 3000 series CNC plasma cutting downdraft table and slag removal system.

When plasma cutters operate there are massive amounts of fumes and molten metal (slag) being thrown around. A downdraft table is meant to safely evacuate as much fumes from the work area as possible and to collect all the molten metal (slag) in one area for easy removal at a later time.

The current table that Multi-Cam uses has no issues but the design is over 10 years old. Project Vader is the pursuit to design/fabricate a downdraft table that can evacuate more fumes, provide a more efficient way to remove slag, and be more aesthetically pleasing.

Multicam can then incorporate Project Vader in their current 3000 series CNC plasma cutting tables.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

MultiCam CNC CUTTING SOLUTIONS

MultiCam Team Saturn

Team Members:

- Gabriel McAdams
- Ryan McCarthy
- Jessie Ross
- Jonathan Shockey
- Emily Smith

External Sponsors/Mentors:

- MultiCam
- David Smart
- Chad Hart

Internal Sponsors/Mentors:

- Professor Mark Wasikowski
- Professor Xiaohua Li

Abstract:

Team Saturn was responsible for redesigning MultiCam's 15 year old rotary tool changer for their 5000 and 7000 series routers.

The major problems with the current design were inadequate protection of tools from debris when the CNC cuts material and the position of the motor being on topof the cover leaves little room for the dust collector on the spindle carriage.

We first started off by brainstorming possible design solutions. We narrowed the ideas down to 2 possible solutions and chose the most feasible option. From there we used SolidWorks simulations to modify our design so that it would meet the design criteria.

Completing this project was important to MulitCam because many failures occurred when debris got inside the tools and the spindle tried to grab them. This is not good for production because a CNC router is supposed to be as automated as possible.

We'd like to thank MultiCam for supporting us through the design process and financing our chosen design. They were a big help in getting our project done on time. We'd also like to thank Dr. Li and Dr. Wasikowski for giving us new ideas to think about and teaching us new skills to complete the project.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

INNOVATION QUALITY PERFORMANCE
MULTICAM
Complete CNC Solutions

Level Jet Water-Jet CNC Height Sensor

Team Members:

- Corey Holmes
- Nicholas Monroe
- Brian Espinoza
- Giang Phan

External Sponsors/Mentors:

- MULTICAM Complete CNC Solutions
- Richard Carey
- James Wright
- Tony McGrew

Internal Sponsors/Mentors:

- MEE Department
- Dr. Li

Abstract:

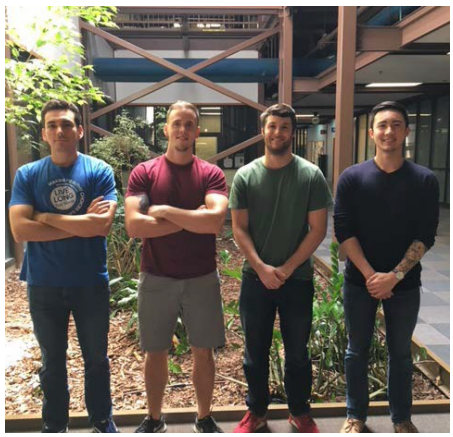
Currently there is no permanent solution for a height sensor on MULTICAM's water-jet CNC machine.

The height sensor must be able to determine the standoff distance between the cutting tip and the material in which it is cutting. In addition all external components must be kept to a minimum and be easily replaceable.

The main issue tends to arise when cutting thin or cheaper metals. These tend to have built up stresses in them causing the material to deform as it is being cut. Because of this the carbide tip runs the risk of impacting the material. Incorporating height and crash detection sensors are crucial to the design and development of this project.

A breakthrough with our design is the simplicity of the crash detection and its ability to be easily reset. This ensures continuous CNC operations with little down time.

Introducing this design to MULTICAM's water-jet will reduce production time and cost for the operator of this CNC



Special thanks to Tony McGrew for giving us this opportunity, along with the mentorship from James Wright and Richard Carey.

We would like to thank Dr. Li and the MEE department for their help and guidance as well.

UNT COLLEGE OF ENGINEERING
EST. 1890

ORORA Visual

Team Papyrus

Team Members:

- Orlando Rodriguez
- Mohammed Rafiq Reaz
- Ubayd Rabbani
- Abdullah Alanazi
- Edward Sean Gates

External Sponsors/Mentors:

- Richard Burke
  VP of Optimization@ Orora Visual

Internal Sponsors/Mentors:

- Dr. Qualls
- Dr. Wasikowski

Abstract:

Increased orders mean increased shipments which can exhaust a normal human crew. Our design is to use a cobot, the UR-10 model, to effectively supplement the packing lines to increase productivity. The scope of the completed project will be rather large and, if successful, would spread to the rest of the Orora facilities. Our objective was to automate the cobot on a mobile modular track system, that through later software development, could sync to a cloud to retrieve order information, scan packaging slips, while pick and placing products from a rack to a moving conveyor belt.

The cart concept is a rolling plate inside a slotting tray, which sits upon casters for mobility. The cart portion is interlocking for modular needs and elevated to be a similar height as the conveyor belt. Additionally was designed a counting end-effector to process large number of small sheets of product, allowing product to be quickly organized.

Acknowledgments: Hayden Winborn and Andrew Renzetti for going out of their way to assist our team.

Senior Design Day 2018

Suspension and Chassis/UNT FSAE

Team Members:

- Aaron Partida
- Chris Boucher
- Mumtaz Farooq
- Reece Loughmiller
- Ryan Knight

External Sponsors/Mentors:

- American Water Jet

Internal Sponsors/Mentors:

- Richard Zhang
- Mark Wasikowski

Abstract:

The University of North Texas Formula SAE team is competing in the 2018 Lincoln event as a sixth year team. After placing 13th overall in 2017, the team set its sights on making changes to the systems of the car for weight reduction, increased strength, and higher degree of accuracy in manufacturing. The senior design system focus is the suspension and chassis of the car. The goal of this design project is to redesign and fabricate the suspension and chassis of the UNT Formula SAE car. The suspension is being redesigned a better lightweight geometry. The new suspension design will allow the driver have more control of the steering of the car. The three key changes in the steering systems were; a one piece double U-Joint instead of two single U-Joints, splined steering shafts as opposed to SAE Grade 5 cross bolts, a needle thrust bearing for the steering column support, and a premium quick-release hub. These changes resulted in significant reductions in steering systems play. The interaction of a vehicle's suspension and chassis is crucial for producing a car that is predictable and balance when pushed to its limits. The chassis design goal was reducing weight and increasing torsional rigidity while complimenting suspension changes.

UNT COLLEGE OF ENGINEERING
EST. 1890

Solarity

Team Members:

- Bailey, Jase
- Guerrero, Viviana
- Lambe, Conor
- McEwen, Aaron
- Trevino, Cathleen

External Sponsors/Mentors:

- UNT Facilities
- Lukins, Josh

Internal Sponsors/Mentors:

- Zhang, Haifeng

Abstract:

We are designing a solar canopy to cover most of the parking spaces on the top floor of the Highland Street Garage. The energy generated by the solar panels will help UNT save money on electricity, which will allow the canopy to pay for itself over time, and the canopy will contribute to UNT's image as being environmentally friendly and sustainable. Additionally, the canopy is expected to help UNT Transportation Services generate more revenue, since people are more likely to pay to park on the top floor of the garage if the parking spaces are covered.

UNT COLLEGE OF ENGINEERING
EST. 1890

Team STEMinist's – Educational Wind Turbine

Team Members:

- Roxanne M. Chavarria
- Amanda Schneider
- Nick Tomerlin
- Nate Anderson
- Jesse Sky King

External Sponsors/Mentors:

- Reynolds Advanced Materials

Internal Sponsors/Mentors:

- Dr. Mark Wasikowski
- Dr. Russell Reid

Abstract:

The primary focus of this study was to demonstrate how blade designs alter the power production of a wind turbine. The University Of North Texas (UNT) offers a wide array of engineering elective courses but most lack classroom models. For this reason, a wind turbine with four distinct blades was designed, engineered, and manufactured for the Alternative Energy (MEEN 4110) elective at UNT. The following four blade designs were chosen:

- Short Design
- Flat Blade
- Increased Tip Radius
- Wide Blade

The completion of this senior design project could not have been possible without the participation and assistance of Dr. Mark Wasikowski, Dr. Russell Reid, Robbin Shull, MEEN Department Staff and the University of North Texas.

We would like to convey our gratefulness for the invaluable guidance, suggestions, and support throughout the course of this project.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

TLC ENGINEERING FOR ARCHITECTURE

Team TLC

Team Members:

- Waleed Falltatah
- Trevor Gomez
- Darrius Green
- Taylor Swanson

External Sponsors/Mentors:

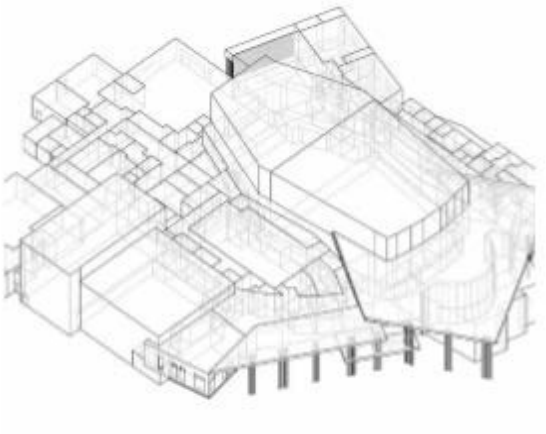
- TLC Engineering for Architecture

Internal Sponsors/Mentors:

- Tae-Youl Choi

Abstract:

According to the U.S. Energy Information Administration, buildings make up 47.6% of the U.S Energy Consumption by sector. In order to reduce this large consumption, organizations have been put into place with the goal that every new building possess a net zero energy consumption by the year 2030. To achieve this goal energy modeling software is used in determining a building's necessary HVAC load. Energy models provide engineers an accurate real-life representation of the thermal properties within the building. From the Energy model data Engineers can size the mechanical system to be exactly what the building requires. HKS Architecture and the city of Arlington are in need of an HVAC system design for the new Arlington Performing Arts Center. To provide proper mechanical system drawings we utilized the energy model method to determine the necessary mechanical system and equipment sizing for the building. Thus reducing wasted energy from oversizing equipment and moving us one step closer to the 2030 goal. Alternative energy solutions, such as geothermal, do exist however there is a large limitations in Professional engineers with experience in alternative energy solutions.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Team Trebuchet

Team Members:

- Michael Adams, David Ebert, Madison Hofmann-Molovich, Matt Reinhard

External Sponsors/Mentors:

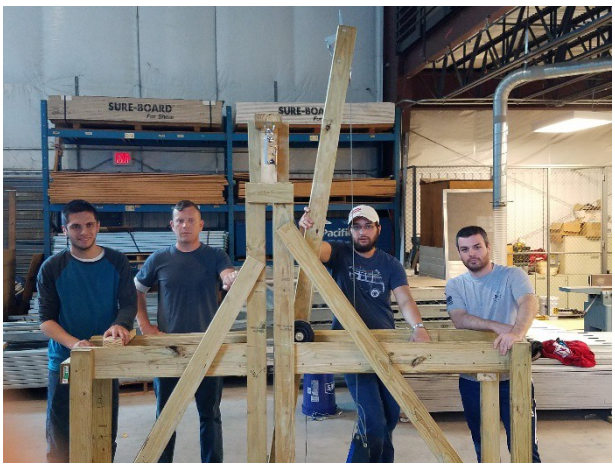
- None

Internal Sponsors/Mentors:

- UNT MEEN Department
- Dr. R. Zhang

Abstract:

The purpose of our project was to take a medieval device called the trebuchet, used as a siege weapon in the 13th century, and improve the design. We approached the problem by deviating from the traditional design and using a floating-arm trebuchet (FAT) design. This design maximizes the kinetic energy of the counter weight by allowing the counter weight to freefall straight down instead of the traditional elliptical path. This allows more energy to be transferred to the throwing arm and thus throwing the projectile further. Therefore, we were able to use our engineering education to improve an old medieval weapon system.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Triumph Group
Aerospace Structures

Team Aerobots

Team Members:

- Jeremy Anunda
- Bobbye Gentry
- Brian Masinag
- Meghan Rodriguez
- Ryan Williford

External Sponsors/Mentors:

- Don Surratt, Triumph Aerospace Structures

Internal Sponsors/Mentors:

- Mark Wasikowski, University of North Texas

Abstract:

Triumph's current fastener installation process in aircraft skin panels is mostly done by a human. A mechanic is required to place a "stencil/template" depending on the size and shape of these panels on the aircraft skin and mark fastener positions for thousands of rivets. After this is completed, the fasteners will be grouped/boxed together based on hole sizes by drawing boxes, lines, or symbols that denote countersink or not, or a combination of all three of these processes to aid in the correct hole size to be drilled by a human or by specialized autorivet machines. Not only is this process time consuming, human error can play a role in the accuracy of these markings causing repair and in some cases scrap the expensive parts. The position markings placed on the panels cannot be off by more than .030 thousandths of an inch, roughly ½ the thickness of a penny to stay within required engineering tolerances.

In order to reduce manufacturing time, cost and potential scrap, our team was given the opportunity to automate the fastener marking system. Our team is utilizing a UR-10 COBOT, a 60 pound collaborative robot provided by Universal Robots. This allows the same mechanic who would normally spend twice the time marking fastener positions and hole sizes to perform other value-added work while the COBOT performs this repetitive marking task. By doing this, the fastener process on aircraft skin panels is much more efficient, repeatable, accurate and reduces scrap costs.

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

Triumph Group
Aerospace Structures

Team GSD: Automated COBOT Stencilling

Team Members:

- Morgan Blankenship
- Aubri Frost
- Zane Jackson
- Benjamin Karten
- Alexander Hayden Winborn

External Sponsors/Mentors:

- Triumph Aerospace
- Don Surratt

Internal Sponsors/Mentors:

- Dr. Russell Reid
- Dr. Mark Wasikowski

Abstract:

Mechanics working for Triumph Aerospace are currently having to mark parts by hand which leaves room for human error. They are required to reference drawings every time they make a mark which is tedious and time consuming. Our solution is to create a collaborative robot easily programmed to stencil parts. We were tasked with creating an end effector for a collaborative robot to mark small parts. The cobot will move parts to a new work space using suction cups or grippers, reorient to mark the part with a sharpie end effector, and place parts back to the original box. Our team designed and fabricated three separate end effectors for moving and marking parts, a work space for parts to be stabilized on while being marked, and a jig for the box of parts to sit. Implementing this cobot into Triumph Aerospace will reduce error in part markings which will save time and cost.

Other acknowlagements: Team Aerobots

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

UNT

UNT HVAC

Team Members:

- Kirk Plum
- Devin Prosser
- Dillon Novais
- Mohammed Baqurayn
- Jaclyn Van Hauen

External Sponsors/Mentors:

- Josh Lukins
- UNT Facilities

Internal Sponsors/Mentors:

- Vish Prasad
- Shaojie Wang

Abstract:

We worked with UNT Facilities to design HVAC systems for the computer server rooms in Sage Hall and the University Services Building. Currently the computer server rooms for Sage Hall and the University Services Building are being served by HVAC systems that serve other parts of the building as well. Computer server rooms need to be served 24/7 as they are critical zones. Other areas in the buildings do not need to be served 24/7, so when they are unoccupied they are currently still being cooled and heated. This leads to extra energy and money being spent that could otherwise be conserved. If separate computer server room units were added then during unoccupied hours UNT could shut off the systems serving unoccupied spaces which would save energy and money. Through energy modeling we calculated the energy and cost savings that implementing separate computer server room units could provide. We then used the savings and the cost of adding new units to determine a payback well within the 7 year range.

We would like to thank Josh Lukins & UNT Facilities, Dr. Mark Wasikowski, Dr. Vish Prasad, and Dr. Shaojie Wang for their help in completing this project.

UNT COLLEGE OF ENGINEERING
EST. 1890

Shallow Water Bay Boat/ Z13

Team Members:

- Tim Drozd
- Kody Wade
- Brandon Phillips

External Sponsors/Mentors:

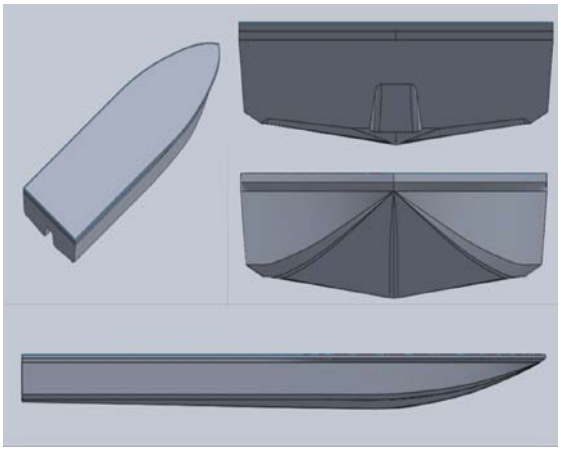
- Lakeview Marina
- Johnson County Foam
- James Propeller
- Composite One

Internal Sponsors/Mentors:

- Nandika D'Souza

Abstract:

The problem that we were trying to solve is designing a shallow water skiff that would draft and run in less than 6-inches of water. Our solution to this problem is to implement a shallow water tunnel to help channel the water up to the prop without needing the prop to hang below the bottom of the hull. The tunnel allows us to achieve the 6-inch depth we were aiming for. Some of our design limitations are holding 2 people, weight, and the ability to haul 2 of these boats on a single trailer. This product was created using Solidworks to generate a 3D model, which then allowed us to have the company Johnson County Foam CNC the hull out of foam. One drawback of using foam was that the fiberglass resin would melt the foam, this meant we had to apply paper mache over the foam to protect it. After this we applied, fiberglass and sanded it down to create a smooth final product. This project is important for the fishing industry, as it provides a low-cost skiff with the ability to run in the shallow waters that bay fisherman would need.



Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

ZODIAC AEROSPACE
Zodiac Seats U.S.

Zodiac Composites – Armrest Weight Reduction

Team Members:

- Mandhr Al-Alawi
- Maadh Al-Badi
- James Mairson
- Luis Najar

External Sponsors/Mentors:

- Jeremy Green
- Kevin Creed
- Damian Diaz

Internal Sponsors/Mentors:

- Dr. Nandika D'Souza
- Dr. Mark Wasikowski

Abstract:

With the increasing use of composite materials in the aerospace industry, ZSUS tasked us with replacing a current metallic component of their seats with a redesigned lightweight composite, thereby making the seat more marketable to clients. We chose to modify the armrest core of their current Z-300 style seat, presently machined from 7075-T6 aluminum, with a high strength carbon fiber fabric and epoxy matrix to increase the structural strength and reduce weight.

In accordance with ZSUS safety standards and SAE aerospace standard AS8049A, armrests must be designed to meet handling and service load cases of 300lbf, 200lbf, and 150lb as well as fatigue loading without compromising seat safety.

After running FEA simulations our research shows the armrest core experiences high von misses stresses in the elbow region, which makes a complete carbon fiber piece unsuitable. Therefore, our project encompasses the bonding of a newly designed aluminum elbow with a carbon fiber sandwich structure to form an armrest core which is both lightweight and structurally sound. Using Solidworks, we redesigned the aluminum elbow with guide geometry that allows the carbon fiber beam-end to soundly bond to the aluminum guides. Further simulation analysis shows the bonded assembly will not fail and meets the listed load criteria.

Special thanks to Zodiac FEA engineer Ali Mohiti, who walked us through the Abaqus software and Dr. Hyeonu Heo who taught us to run simulations on the ANSYS workbench software! Also acknowledgements to Tonoy Chowdhury for helping us with composite property research and Lee Smith for Vacuum bagging demonstrations!

Senior Design Day 2018

UNT COLLEGE OF ENGINEERING
EST. 1890

ZODIAC AEROSPACE
Zodiac Seats U.S.

Zodiac Autobots Robotics

Team Members:

- Andrew Marien
- Troy Nakagawa
- Ismael Reyna
- Muhammad Riaz

External Sponsors/Mentors:

- Zodiac Seats U.S.
- Ronnie Dieter
- Jeremy Green

Internal Sponsors/Mentors:

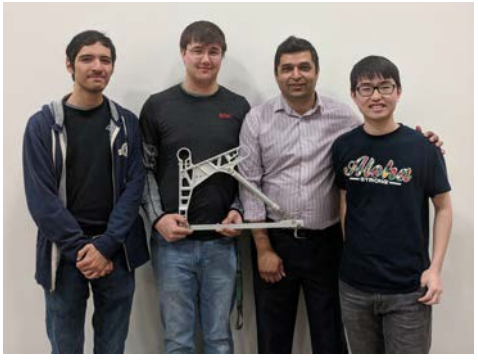
- Dr. Cherish Qualls
- Dr. Mark Wasikowski
- Mr. Robin Shull

Abstract:

Our client Zodiac Seats US is one of the biggest suppliers of the aircraft seats to plane manufactures and airlines all over the world.

This project details the automation of commercial aircraft seat assembly intending to reduce time, labor cost, increase seat production, and ergonomics. The automation is achieved by using Universal Robots. The UR3 and UR10 are programmed to coordinate with each other to pick and place parts, and torque in the bolts. Molds are manufactured to hold the parts in place while the robots torque the bolts with the help of custom end effector.

The requirements of this project is not only the torque specifications, but also weight that robot can hold, the reach of the robot, space available at the manufacturing facility, and the budget. Our project meets all torque requirements and weight requirements, but has yet to be tested to see if it can reduce cost and time. With further iterations and testing cost and time reduction can be achieved.



Other Acknowledgements: Thank you to all friends and family who helped us throughout our college experience.

Senior Design Day 2018